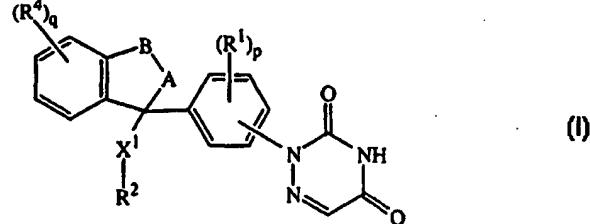




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(54) Title: IL-5 INHIBITING 6-AZURACIL DERIVATIVES			
(57) Abstract			
<p>The present invention is concerned with the compounds of formula (I) the <i>N</i>-oxides, the pharmaceutically acceptable addition salts and the stereochemically isomeric forms thereof, wherein p is 0 to 3; q is 0 to 4; –A–B– represents $-(CH_2)_r-$, $-(CH_2)_r-O-$, $-(CH_2)_r-S(=O)_u-$ or $-(CH_2)_r-NR^3-$; r is 2 to 4; t is 1 to 3; u is 0 to 2; X¹ is O, S, NR³ or a direct bond; R¹ and R⁴ are C₁-alkyl, halo, polyhaloC₁-alkyl, hydroxy, mercapto, C₁-alkyloxy, C₁-alkylthio, C₁-alkylcarbonyloxy, aryl, cyano, nitro, Het³, R⁶, NR⁷R⁸ or substituted C₁-alkyl; R² is aryl, Het¹, C₃-cycloalkyl, cyano, optionally substituted C₁-alkyl, $-C(=Q)-X^2-R^{15}$; R³ is hydrogen or C₁-alkyl; R¹⁵ is hydrogen, optionally substituted C₁-alkyl, C₃-cycloalkyl, aryl; where X² is a direct bond, R¹⁵ may also be halo or Het¹; where X² is NR⁵, R¹⁵ may also be hydroxy; where X² is C(=O)-NH-NH or NH-NH-C(=O), R¹⁵ may be replaced by R¹¹; Q is O, S or NR³; X² is O, S, NR⁵, C(=O)-NH-NH, NH-NH-C(=O) or a direct bond; R⁵ is hydrogen, C₁-alkyl, C₁-alkyloxy or arylC₁-alkyl; R⁶ is a sulfonyl or sulfinyl derivative; R⁷ and R⁸ are independently hydrogen, optionally substituted C₁-alkyl, aryl, a carbonyl containing moiety, C₃-cycloalkyl, $-Y-C_{1-4}alkanediyl-C(=O)-O-R^{14}$, Het³ and R⁶; R¹¹ is hydroxy, mercapto, cyano, nitro, halo, trihalomethyl, C₁-alkyloxy, formyl, trihaloC₁-alkylsulfonyloxy, R⁶, NR⁷R⁸, C(=O)NR⁷R⁸, C₁-alkanediyl-C(=O)-O-R¹⁴, $-C(=O)-O-R^{14}$, $-Y-C_{1-4}alkanediyl-C(=O)-O-R^{14}$, aryl, aryloxy, arylcarbonyl, C₃-cycloalkyl, C₃-cycloalkyloxy, phthalimide-2-yl, Het³, Het⁴ and C(=O)Het³; aryl is optionally substituted phenyl; Het¹, Het², Het³ and Het⁴ are optionally substituted heterocycles; to processes for their preparation and compositions comprising them. It further relates to their use as a medicine.</p>			
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IL-5 INHIBITING 6-AZURACIL DERIVATIVES

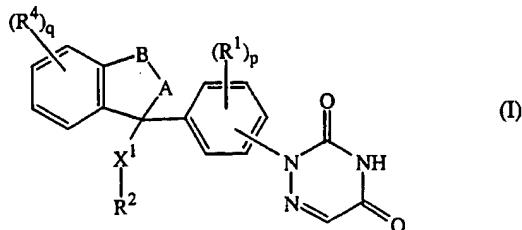
The present invention concerns IL-5 inhibiting 6-azauracil derivatives useful for treating
 5 eosinophil-dependent inflammatory diseases; to processes for their preparation and compositions comprising them. It further relates to their use as a medicine.

Eosinophil influx, leading to subsequent tissue damage, is an important pathogenic event in bronchial asthma and allergic diseases. The cytokine interleukin-5 (IL-5), produced
 10 mainly by T lymphocytes as a glycoprotein, induces the differentiation of eosinophils in bone marrow and, primes eosinophils for activation in peripheral blood and sustains their survival in tissues. As such, IL-5 plays a critical role in the process of eosinophilic inflammation. Hence, the possibility that inhibitors of IL-5 production would reduce the production, activation and/or survival of eosinophils provides a therapeutic approach to
 15 the treatment of bronchial asthma and allergic diseases such as, atopic dermatitis, allergic rhinitis, allergic conjunctivitis, and also other eosinophil-dependent inflammatory diseases.

Steroids, which strongly inhibit IL-5 production *in vitro*, have long been used as the
 20 only drugs with remarkable efficacy for bronchial asthma and atopic dermatitis, but they cause various serious adverse reactions such as diabetes, hypertension and cataracts. Therefore, it would be desirable to find non-steroidal compounds having the ability to inhibit IL-5 production in human T-cells and which have little or no adverse reactions.

25 US 4,631,278 discloses α -aryl-4-(4,5-dihydro-3,5-dioxo-1,2,4-triazin-2(3*H*)-yl)-benzeneacetonitriles and US 4,767,760 discloses 2-(substituted phenyl)-1,2,4-triazine-3,5(2*H*,4*H*)-diones, all having anti-protozoal activity, in particular, anti-coccidial activity. EP 831,088 discloses 1,2,4-triazine-3,5-diones as anticoccidial agents.
 30 Unexpectedly, the 6-azauracil derivatives of the present invention prove to be potent inhibitors of the production of IL-5.

The present invention is concerned with the compounds of formula



the *N*-oxides, the pharmaceutically acceptable addition salts and the stereochemically isomeric forms thereof, wherein :

- p represents an integer being 0, 1, 2 or 3;
- q represents an integer being 0, 1, 2, 3 or 4;
- 5 -A-B- represents -(CH₂)_r, -(CH₂)_t-O-, -(CH₂)_t-S(=O)_u- or -(CH₂)_t-NR³-;
 - r represents 2, 3 or 4;
 - each t independently represents 1, 2 or 3;
 - u represents 0, 1 or 2;
 - X¹ represents O, S, NR³ or a direct bond;
- 10 each R¹ independently represents C₁₋₆alkyl, halo, polyhaloC₁₋₆alkyl, hydroxy, mercapto, C₁₋₆alkyloxy, C₁₋₆alkylthio, C₁₋₆alkylcarbonyloxy, aryl, cyano, nitro, Het³, R⁶, NR⁷R⁸ or C₁₋₄alkyl substituted with Het³, R⁶ or NR⁷R⁸;
 - each R⁴ independently represents C₁₋₆alkyl, halo, polyhaloC₁₋₆alkyl, hydroxy, mercapto, C₁₋₆alkyloxy, C₁₋₆alkylthio, C₁₋₆alkylcarbonyloxy, aryl, cyano, nitro, Het³, R⁶,
- 15 NR⁷R⁸ or C₁₋₄alkyl substituted with Het³, R⁶ or NR⁷R⁸;
 - R² represents aryl, Het¹, C₃₋₇cycloalkyl, cyano, C₁₋₆alkyl, -C(=Q)-X²-R¹⁵ or C₁₋₆alkyl substituted with one or two substituents selected from hydroxy, cyano, amino, mono- or di(C₁₋₄alkyl)amino, C₁₋₆alkyloxy, C₁₋₆alkylsulfonyloxy, C₁₋₆alkyloxycarbonyl, C₃₋₇cycloalkyl, aryl, aryloxy, arylthio, Het¹, Het¹oxy, Het¹thio and -C(=Q)-X²-R¹⁵;
- 20 each R³ independently represents hydrogen or C₁₋₄alkyl;
 - each R¹⁵ independently represents hydrogen, C₁₋₆alkyl, C₃₋₇cycloalkyl, aryl or C₁₋₆alkyl substituted with aryl, halo, hydroxy or Het¹;
 - where X² is a direct bond, R¹⁵ may also be halo or Het¹;
 - where X² is NR⁵, R¹⁵ may also be hydroxy;
- 25 where X² is C(=O)-NH-NH or NH-NH-C(=O), R¹⁵ may be replaced by R¹¹;
 - each Q independently represents O, S or NR³;
 - each X² independently represents O, S, NR⁵, C(=O)-NH-NH, NH-NH-C(=O) or a direct bond;
 - R⁵ represents hydrogen, C₁₋₆alkyl, C₁₋₆alkyloxy or arylC₁₋₆alkyl;
- 30 each R⁶ independently represents C₁₋₆alkylsulfonyl, aminosulfonyl, mono- or di-(C₁₋₄alkyl)aminosulfonyl, mono- or di(benzyl)aminosulfonyl, polyhaloC₁₋₆alkyl-sulfonyl, C₁₋₆alkylsulfinyl, phenylC₁₋₄alkylsulfonyl, piperazinylsulfonyl, amino-piperidinylsulfonyl, piperidinylaminosulfonyl, N-C₁₋₄alkyl-N-piperidinylaminosulfonyl or mono- or di(C₁₋₄alkyl)aminoC₁₋₄alkylsulfonyl;
- 35 each R⁷ and each R⁸ are independently selected from hydrogen, C₁₋₄alkyl, hydroxy-C₁₋₄alkyl, dihydroxyC₁₋₄alkyl, aryl, arylC₁₋₄alkyl, C₁₋₄alkyloxyC₁₋₄alkyl, C₁₋₄alkyl-carbonyl, aminocarbonyl, arylcarbonyl, Het³carbonyl, C₁₋₄alkylcarbonyloxy-C₁₋₄alkyl-

carbonyl, hydroxyC₁₋₄alkylcarbonyl, C₁₋₄alkyloxycarbonylcarbonyl, mono- or di(C₁₋₄alkyl)aminoC₁₋₄alkyl, arylaminocarbonyl, arylaminothiocarbonyl, Het³amino-carbonyl, Het³aminothiocarbonyl, C₃₋₇cycloalkyl, pyridinylC₁₋₄alkyl, C₁₋₄alkanediyl-C(=O)-O-R¹⁴, -C(=O)-O-R¹⁴, -Y-C₁₋₄alkanediyl-C(=O)-O-R¹⁴, Het³ and R⁶;

5 each Y independently represents O, S, NR³, or S(O)₂;

R⁹ and R¹⁰ are each independently selected from hydrogen, C₁₋₄alkyl, hydroxyC₁₋₄alkyl, dihydroxyC₁₋₄alkyl, phenyl, phenylC₁₋₄alkyl, C₁₋₄alkyloxycarbonylcarbonyl, aminocarbonyl, phenylcarbonyl, Het³carbonyl, C₁₋₄alkylcarbonyloxyC₁₋₄alkylcarbonyl, hydroxyC₁₋₄alkylcarbonyl, C₁₋₄alkyloxycarbonylcarbonyl, mono- or

10 di(C₁₋₄alkyl)aminoC₁₋₄alkyl, phenylaminocarbonyl, phenylaminothiocarbonyl, Het³aminocarbonyl, Het³aminothiocarbonyl, C₃₋₇cycloalkyl, pyridinylC₁₋₄alkyl, C₁₋₄alkanediyl-C(=O)-O-R¹⁴, -C(=O)-O-R¹⁴, -Y-C₁₋₄alkanediyl-C(=O)-O-R¹⁴, Het³ and R⁶;

each R¹¹ independently being selected from hydroxy, mercapto, cyano, nitro, halo, trihalomethyl, C₁₋₄alkyloxy, formyl, trihaloC₁₋₄alkylsulfonyloxy, R⁶, NR⁷R⁸, C(=O)NR⁷R⁸, -C(=O)-O-R¹⁴, -Y-C₁₋₄alkanediyl-C(=O)-O-R¹⁴, aryl, aryloxy, arylcarbonyl, C₃₋₇cycloalkyl, C₃₋₇cycloalkyloxy, phthalimide-2-yl, Het³, Het⁴ and C(=O)Het³;

15 R¹² and R¹³ are each independently selected from hydrogen, C₁₋₄alkyl, hydroxyC₁₋₄alkyl, dihydroxyC₁₋₄alkyl, phenyl, phenylC₁₋₄alkyl, C₁₋₄alkyloxycarbonylcarbonyl, phenylcarbonyl, C₁₋₄alkylcarbonyloxyC₁₋₄alkylcarbonyl, hydroxyC₁₋₄alkylcarbonyl, C₁₋₄alkyloxycarbonylcarbonyl, mono- or di(C₁₋₄alkyl)aminoC₁₋₄alkyl, phenylaminocarbonyl, phenylaminothiocarbonyl, C₃₋₇cycloalkyl, pyridinylC₁₋₄alkyl, C₁₋₄alkanediyl-C(=O)-O-R¹⁴, -C(=O)-O-R¹⁴, -Y-C₁₋₄alkanediyl-C(=O)-O-R¹⁴ and R⁶;

20 25 each R¹⁴ independently represents hydrogen, C₁₋₄alkyl, C₃₋₇cycloalkyl, aminocarbonylmethylene, mono- or di(C₁₋₄alkyl)aminocarbonylmethylene, mono- or di(C₃₋₇cycloalkyl)aminocarbonylmethylene, azetidin-1-ylcarbonylmethylene, pyrrolidin-1-ylcarbonylmethylene, piperidin-1-ylcarbonylmethylene or homopiperidin-1-ylcarbonylmethylene;

30 35 aryl represents phenyl optionally substituted with one, two or three substituents each independently selected from nitro, azido, cyano, halo, hydroxy, C₁₋₄alkyl, C₃₋₇cycloalkyl, C₁₋₄alkyloxy, formyl, polyhaloC₁₋₄alkyl, NR⁹R¹⁰, C(=O)NR⁹R¹⁰, C(=O)-O-R¹⁴, R⁶, -O-R⁶, phenyl, Het³, C(=O)Het³ and C₁₋₄alkyl substituted with hydroxy, C₁₋₄alkyloxy, C(=O)-O-R¹⁴, -Y-C₁₋₄alkanediyl-C(=O)-O-R¹⁴, Het³ or NR⁹R¹⁰;

Het¹ represents a heterocycle selected from pyrrolyl, pyrrolinyl, imidazolyl, imidazolinyl, pyrazolyl, pyrazolinyl, triazolyl, tetrazolyl, furanyl, tetrahydrofuranyl, thienyl,

thiolanyl, dioxolanyl, oxazolyl, oxazolinyl, isoxazolyl, thiazolyl, thiazolinyl, isothiazolyl, thiadiazolyl, oxadiazolyl, pyridinyl, pyrimidinyl, pyrazinyl, pyranyl, pyridazinyl, pyrrolidinyl, piperidinyl, piperazinyl, morpholinyl, thiomorpholinyl, dioxanyl, dithianyl, trithianyl, triazinyl, benzothienyl, isobenzothienyl, benzofuranyl, 5 isobenzofuranyl, benzothiazolyl, benzoxazolyl, indolyl, isoindolyl, indolinyl, purinyl, 1*H*-pyrazolo[3,4-d]pyrimidinyl, benzimidazolyl, quinolyl, isoquinolyl, cinnolinyl, phtalazinyl, quinazolinyl, quinoxaliny, thiazolopyridinyl, oxazolopyridinyl and imidazo[2,1-b]thiazolyl; wherein said heterocycles each independently may optionally be substituted with one, or where possible, two or three substituents each independently selected from Het², R¹¹ and C₁₋₄alkyl optionally substituted with one or two substituents independently selected from Het² and R¹¹;

10 Het² represents a heterocycle selected from pyrrolyl, pyrrolinyl, imidazolyl, imidazolinyl, pyrazolyl, pyrazolinyl, triazolyl, tetrazolyl, furanyl, tetrahydrofuranly, thienyl, thiolanyl, dioxolanyl, oxazolyl, oxazolinyl, isoxazolyl, thiazolyl, thiazolinyl, 15 isothiazolyl, thiadiazolyl, oxadiazolyl, pyridinyl, pyrimidinyl, pyrazinyl, pyranyl, pyridazinyl, dioxanyl, dithianyl, trithianyl, triazinyl, benzothienyl, isobenzothienyl, benzofuranyl, isobenzofuranyl, benzothiazolyl, benzoxazolyl, indolyl, isoindolyl, indolinyl, purinyl, 1*H*-pyrazolo[3,4-d]pyrimidinyl, benzimidazolyl, quinolyl, isoquinolyl, cinnolinyl, phtalazinyl, quinazolinyl, quinoxaliny, thiazolopyridinyl, oxazolopyridinyl, 20 and imidazo[2,1-b]thiazolyl; wherein said heterocycles each independently may optionally be substituted with one, or where possible, two or three substituents each independently selected from R¹¹ and C₁₋₄alkyl optionally substituted with one or two substituents independently selected from R¹¹;

25 Het³ represents a monocyclic heterocycle selected from pyrrolidinyl, piperidinyl, piperazinyl, morpholinyl, thiomorpholinyl and tetrahydropyranyl; wherein said monocyclic heterocycles each independently may optionally be substituted with, where possible, one, two, three or four substituents each independently selected from hydroxy, C₁₋₄alkyl, C₁₋₄alkyloxy, C₁₋₄alkylcarbonyl, piperidinyl, NR¹²R¹³, C(=O)-O-R¹⁴, R⁶ and C₁₋₄alkyl substituted with one or two substituents 30 independently selected from hydroxy, C₁₋₄alkyloxy, phenyl, C(=O)-O-R¹⁴, -Y-C₁₋₄alkanediyl-C(=O)-O-R¹⁴, R⁶ and NR¹²R¹³;

35 Het⁴ represents a monocyclic heterocycle selected from pyrrolyl, imidazolyl, pyrazolyl, triazolyl, tetrazolyl, furanyl, thienyl, oxazolyl, isoxazolyl, thiazolyl, isothiazolyl, thiadiazolyl, oxadiazolyl, pyridinyl, pyrimidinyl, pyrazinyl, pyranyl, pyridazinyl and triazinyl.

As used in the foregoing definitions and hereinafter, halo is generic to fluoro, chloro,

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bromo and iodo; C₃₋₇cycloalkyl is generic to cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl and cycloheptyl; C₁₋₄alkyl defines straight and branched chain saturated hydrocarbon radicals having from 1 to 4 carbon atoms such as, for example, methyl, ethyl, propyl, butyl, 1-methylethyl, 2-methylpropyl, 2,2-dimethylethyl and the like;

5 C₁₋₆alkyl is meant to include C₁₋₄alkyl and the higher homologues thereof having 5 or 6 carbon atoms such as, for example, pentyl, 2-methylbutyl, hexyl, 2-methylpentyl and the like; polyhaloC₁₋₄alkyl is defined as polyhalosubstituted C₁₋₄alkyl, in particular C₁₋₄alkyl substituted with 1 to 6 halogen atoms, more in particular difluoro- or trifluoromethyl; polyhaloC₁₋₆alkyl is defined as polyhalosubstituted C₁₋₆alkyl. The

10 term C₁₋₄alkanediyl defines bivalent straight or branch chained alkanediyl radicals having from 1 to 4 carbon atoms such as, for example, methylene, 1,2-ethanediyl, 1,3-propanediyl, 1,4-butanediyl and the like; C₂₋₆alkanediyl defines bivalent straight or branch chained alkanediyl radicals having from 2 to 6 carbon atoms such as, for example, 1,2-ethanediyl, 1,3-propanediyl, 1,4-butanediyl, 1,5-pentanediyl,

15 1,6-hexanediyl and the like.

Het¹, Het², Het³ and Het⁴ are meant to include all the possible isomeric forms of the heterocycles mentioned in the definition of Het¹, Het², Het³ and Het⁴, for instance, pyrrolyl also includes 2H-pyrrolyl; triazolyl includes 1,2,4-triazolyl and 1,3,4-triazolyl;

20 oxadiazolyl includes 1,2,3-oxadiazolyl, 1,2,4-oxadiazolyl, 1,2,5-oxadiazolyl and 1,3,4-oxadiazolyl; thiadiazolyl includes 1,2,3-thiadiazolyl, 1,2,4-thiadiazolyl, 1,2,5-thiadiazolyl and 1,3,4-thiadiazolyl; pyranyl includes 2H-pyranyl and 4H-pyranyl.

The heterocycles represented by Het¹, Het², Het³ and Het⁴ may be attached to the remainder of the molecule of formula (I) through any ring carbon or heteroatom as appropriate. Thus, for example, when the heterocycle is imidazolyl, it may be a 1-imidazolyl, 2-imidazolyl, 4-imidazolyl and 5-imidazolyl; when it is thiazolyl, it may be 2-thiazolyl, 4-thiazolyl and 5-thiazolyl; when it is triazolyl, it may be 1,2,4-triazol-1-yl, 1,2,4-triazol-3-yl, 1,2,4-triazol-5-yl, 1,3,4-triazol-1-yl and 1,3,4-triazol-2-yl; when it is benzthiazolyl, it may be 2-benzthiazolyl, 4-benzthiazolyl, 5-benzthiazolyl, 6-benzthiazolyl and 7-benzthiazolyl.

The pharmaceutically acceptable addition salts as mentioned hereinabove are meant to comprise the therapeutically active non-toxic acid addition salt forms which the compounds of formula (I) are able to form. The latter can conveniently be obtained by treating the base form with such appropriate acids as inorganic acids, for example, hydrohalic acids, e.g. hydrochloric, hydrobromic and the like; sulfuric acid; nitric acid; phosphoric acid and the like; or organic acids, for example, acetic, propanoic, hydroxy-

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acetic, 2-hydroxypropanoic, 2-oxopropanoic, ethanedioic, propanedioic, butanedioic, (Z)-2-butenedioic, (E)-2-butenedioic, 2-hydroxybutanedioic, 2,3-dihydroxybutanedioic, 2-hydroxy-1,2,3-propanetricarboxylic, methanesulfonic, ethanesulfonic, benzene-sulfonic, 4-methylbenzenesulfonic, cyclohexanesulfamic, 2-hydroxybenzoic, 4-amino-

5 2-hydroxybenzoic and the like acids. Conversely the salt form can be converted by treatment with alkali into the free base form.

The compounds of formula (I) containing acidic protons may be converted into their therapeutically active non-toxic metal or amine addition salt forms by treatment with
10 appropriate organic and inorganic bases. Appropriate base salt forms comprise, for example, the ammonium salts, the alkali and earth alkaline metal salts, e.g. the lithium, sodium, potassium, magnesium, calcium salts and the like, salts with organic bases, e.g. the benzathine, *N*-methyl-D-glucamine, 2-amino-2-(hydroxymethyl)-1,3-propanediol, hydrabamine salts, and salts with amino acids such as, for example, arginine, lysine and
15 the like. Conversely the salt form can be converted by treatment with acid into the free acid form.

The term addition salt also comprises the hydrates and solvent addition forms which the compounds of formula (I) are able to form. Examples of such forms are e.g. hydrates, alcoholates and the like.

20 The *N*-oxide forms of the present compounds are meant to comprise the compounds of formula (I) wherein one or several nitrogen atoms are oxidized to the so-called *N*-oxide. For example, one or more nitrogen atoms of any of the heterocycles in the definition of Het¹, Het² and Het³ may be *N*-oxidized.

25 Some of the compounds of formula (I) may also exist in their tautomeric forms. Such forms although not explicitly indicated in the above formula are intended to be included within the scope of the present invention. For example, a hydroxy substituted triazine moiety may also exist as the corresponding triazinone moiety; a hydroxy substituted pyrimidine moiety may also exist as the corresponding pyrimidinone moiety.

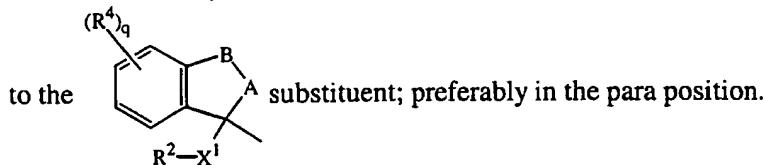
30 The term "stereochemically isomeric forms" as used hereinbefore defines all the possible stereoisomeric forms in which the compounds of formula (I) can exist. Unless otherwise mentioned or indicated, the chemical designation of compounds denotes the mixture of all possible stereochemically isomeric forms, said mixtures containing all diastereomers and enantiomers of the basic molecular structure. More in particular, stereogenic centers may have the R- or S-configuration, used herein in accordance with Chemical Abstracts nomenclature. Stereochemically isomeric forms of the compounds

of formula (I) are obviously intended to be embraced within the scope of this invention.

The compounds of formula (I) and some of the intermediates in the present invention contain one or more asymmetric carbon atoms. The pure and mixed stereochemically
5 isomeric forms of the compounds of formula (I) are intended to be embraced within the scope of the present invention.

Whenever used hereinafter, the term "compounds of formula (I)" is meant to also include their *N*-oxide forms, their pharmaceutically acceptable addition salts, and their
10 stereochemically isomeric forms.

An interesting group of compounds are those compounds of formula (I) wherein the 6-azauracil moiety is connected to the phenyl ring in the para or meta position relative



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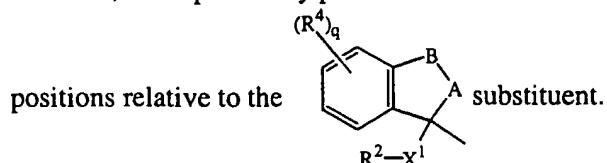
Another interesting group contains those compounds of formula (I) wherein one or more of the following restrictions apply :

- p is 0, 1 or 2;
- q is 0 or 1;
- 20 • -A-B- is -(CH₂)_r or -(CH₂)_r-O-;
- X¹ is S, NR³ or a direct bond; more in particular a direct bond;
- each R¹ independently is halo, polyhaloC₁₋₆alkyl, C₁₋₆alkyl, C₁₋₆alkyloxy or aryl, preferably, chloro or methyloxy, more preferably chloro;
- R² is Het¹, cyano, -C(=Q)-X²-R¹⁵ or C₁₋₆alkyl substituted with one or two
25 substituents selected from hydroxy, cyano, -C(=Q)-X²-R¹⁵, amino, mono- or di(C₁₋₄alkyl)amino, C₁₋₆alkyloxy, C₁₋₆alkylsulfonyloxy, C₁₋₆alkyloxycarbonyl, C₃₋₇cycloalkyl, aryl, aryloxy, arylthio, Het¹oxy and Het¹thio; more in particular Het¹, cyano, -C(=Q)-X²-R¹⁵ or C₁₋₆alkyl substituted with Het¹;
- R⁴ is hydrogen or halo;
- 30 • R¹⁵ is hydrogen or C₁₋₆alkyl, and when X² is a direct bond, R¹⁵ may also be halo, and when X² is C(=O)-NH-NH, R¹⁵ may also be phenyl;
- R⁶ is C₁₋₆alkylsulfonyl or aminosulfonyl;
- R⁷ and R⁸ are each independently hydrogen, C₁₋₄alkyl, Het³ or R⁶;
- R⁹ and R¹⁰ are each independently hydrogen, C₁₋₄alkyloxyC₁₋₄alkyl,
35 C₁₋₄alkylcarbonyl, aminocarbonyl, Het³carbonyl, Het³ or R⁶;

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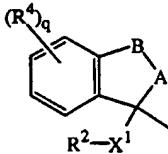
- R¹¹ is cyano, nitro, halo, C₁₋₄alkyloxy, formyl, NR⁷R⁸, C(=O)NR⁷R⁸, -C(=O)-O-R¹⁴, aryl, arylcarbonyl, Het³, Het⁴ and C(=O)Het³, more in particular aryl, -C(=O)-O-R¹⁴,
- R¹⁴ is hydrogen or C₁₋₄alkyl;
- 5 • aryl is phenyl optionally substituted with one, two or three substituents each independently selected from nitro, cyano, halo, hydroxy, C₁₋₄alkyl, C₃₋₇cycloalkyl, C₁₋₄alkyloxy, formyl, polyhaloC₁₋₄alkyl, NR⁹R¹⁰, C(=O)NR⁹R¹⁰, C(=O)-O-R¹⁴, -O-R⁶, phenyl, C(=O)Het³ and C₁₋₄alkyl substituted with hydroxy, C₁₋₄alkyloxy, C(=O)-O-R¹⁴, Het³ or NR⁹R¹⁰, more in particular phenyl optionally substituted with 10 halo or C₁₋₄alkyl;
- 15 • Het¹ is a monocyclic heterocycle selected from pyrrolyl, imidazolyl, pyrazolyl, triazolyl, tetrazolyl, furanyl, thienyl, oxazolyl, isoxazolyl, thiazolyl, isothiazolyl, thiadiazolyl, oxadiazolyl, pyridinyl, pyrimidinyl, pyrazinyl, pyranyl, pyridazinyl and triazinyl, in particular imidazolyl, oxadiazolyl, thiazolyl, pyrimidinyl or pyridinyl, wherein said monocyclic heterocycles each independently may optionally be substituted with one, or where possible, two or three substituents each independently selected from Het², R¹¹ and C₁₋₄alkyl optionally substituted with Het² or R¹¹; preferably Het¹ is oxadiazolyl or thiazolyl each independently and optionally substituted with one, or where possible, two or three substituents each independently selected from R¹¹ and C₁₋₄alkyl optionally substituted with R¹¹;
- 20 • Het² is an aromatic heterocycle; more in particular furanyl, thienyl, pyridinyl or benzothienyl, wherein said aromatic heterocycles each independently may optionally be substituted with one, or where possible, two or three substituents each independently selected from R¹¹ and C₁₋₄alkyl;
- 25 • Het³ is piperidinyl, piperazinyl, morpholinyl and tetrahydropyranyl each independently and optionally substituted with, where possible, one, two, three or four substituents each independently selected from hydroxy, C₁₋₄alkyl, C₁₋₄alkylcarbonyl, piperidinyl and C₁₋₄alkyl substituted with one or two substituents independently selected from hydroxy, C₁₋₄alkyloxy and phenyl;
- 30 • Het⁴ is thienyl.

Special compounds are those compounds of formula (I) wherein p is 1 or 2 and each R¹ is chloro; more preferably p is 2 and the two chloro substituents are in the ortho

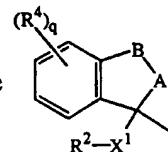


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Particular compounds are those compounds of formula (I) wherein the 6-azauracil



moiety is in the para position relative to the



whereby both R¹ substituents are chloro positioned ortho relative to the

substituent.

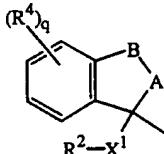
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Other particular compounds are those compounds of formula (I) wherein X¹ is a direct bond and R² is cyano or a monocyclic heterocycle selected from thiazolyl and oxadiazolyl, wherein said monocyclic heterocycles each independently may optionally be substituted with one or two substituents each independently selected from R¹¹ and 10 C₁₋₄alkyl optionally substituted with R¹¹.

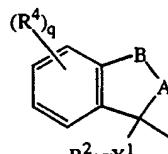
Other preferred compounds are those compounds of formula (I) wherein -A-B- is (CH₂)₂.

More preferred compounds are those compounds of formula (I) wherein -X¹-R² is 15 optionally substituted 2-thiazolyl or 3-oxadiazolyl, the 6-azauracil moiety is in the para

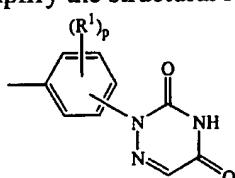
position relative to the



substituents are chloro positioned ortho relative to the



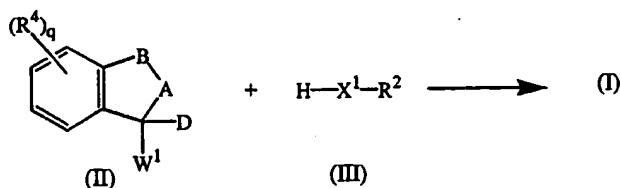
In order to simplify the structural representation of the compounds of formula (I),



20 will hereinafter be represented by the symbol D.

Compounds of formula (I) can generally be prepared by reacting an intermediate of formula (II) wherein W¹ is a suitable leaving group such as, for example, a halogen atom, with an appropriate reagent of formula (III).

-10-



Said reaction may be performed in a reaction-inert solvent such as, for example, acetonitrile, *N,N*-dimethylformamide, acetic acid, tetrahydrofuran, ethanol or a mixture thereof. Alternatively, in case the reagent of formula (III) acts as a solvent, no

5 additional reaction-inert solvent is required. The reaction is optionally carried out in the presence of a base such as, for example, 1,8-diazabicyclo[5.4.0]undec-7-ene, sodium bicarbonate, sodiummethanolate and the like. Convenient reaction temperatures range between -70°C and reflux temperature.

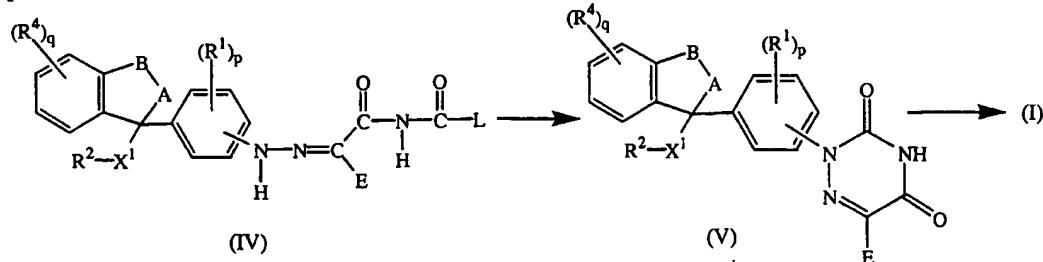
10 In this and the following preparations, the reaction products may be isolated from the reaction medium and, if necessary, further purified according to methodologies generally known in the art such as, for example, extraction, crystallization, distillation, trituration and chromatography.

15 Some of the compounds and intermediates of the present invention can be prepared according to or analogous to the procedures described in EP-A-0,170,316, EP-A-0,232,932 and PCT/EP98/04191.

For instance, compounds of formula (I) may generally be prepared by cyclizing an intermediate of formula (IV) wherein L is a suitable leaving group such as, for example, C₁₋₆alkyloxy or halo, and E represents an appropriate electron attracting group such as, for example, an ester, an amide, a cyanide, C₁₋₆alkylsulfonyloxy and the like groups; and eliminating the group E of the thus obtained triazinedione of formula (V). The cyclization can suitably be carried out by refluxing the intermediate (IV) in acidic

20 medium such as acetic acid and in the presence of a base such as, for example, potassium acetate.

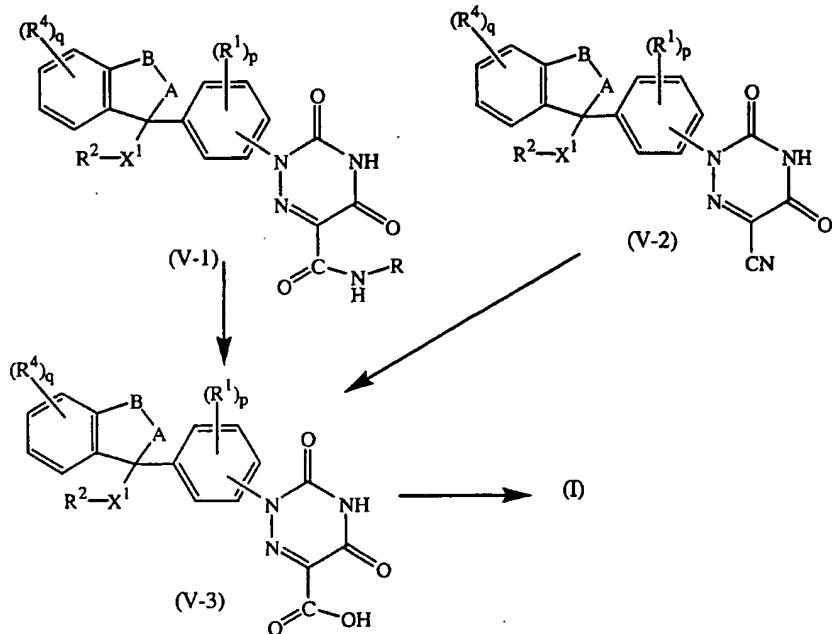
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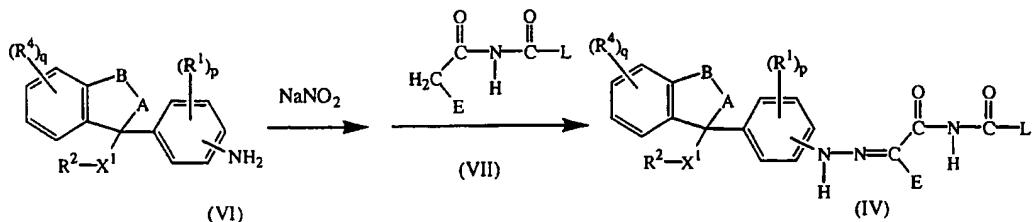
Depending on its nature, E can be eliminated using various art-known elimination procedures. For example when E is an amide or a cyano moiety, it can be hydrolized to

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a carboxylic moiety by for instance refluxing the intermediate bearing the E group in hydrochloric acid and acetic acid. The thus obtained intermediate can then be further reacted with mercaptoacetic acid or a functional derivative thereof to obtain a compound of formula (I). Said reaction is conveniently carried out at elevated 5 temperatures ranging up to reflux temperature.



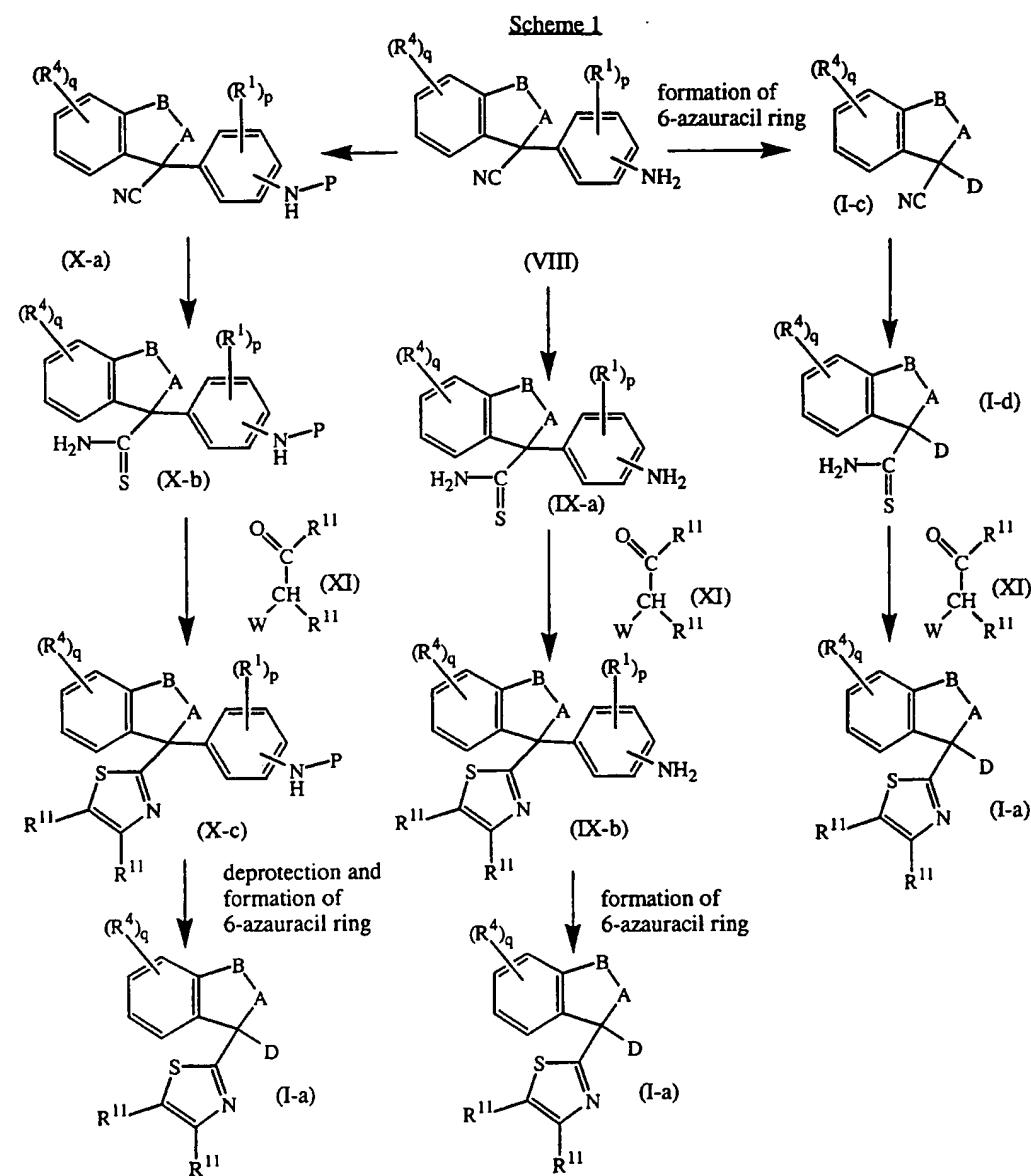
A suitable way to prepare intermediates of formula (IV) involves the reaction of an intermediate of formula (VI) with sodium nitrite or a functional derivative thereof in an acidic medium such as for example hydrochloric acid in acetic acid, and preferably in 10 the same reaction mixture, further reacting the thus obtained intermediate with a reagent of formula (VII) wherein L and E are as defined above, in the presence of a base such as, for example, sodium acetate.



An interesting subgroup comprises those compounds of formula (I) wherein -X¹-R² is an 15 optionally substituted 2-thiazolyl moiety, said compounds being represented by formula (I-a). The optionally substituted 2-thiazolyl moiety can be incorporated in the compounds of formula (I-a) at different stages of the preparation process.

For instance, scheme 1 depicts three possible ways to prepare compounds of formula (I-a).

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A first pathway involves the reaction of the cyano moiety in an intermediate of formula (VIII) to the corresponding thioamide using H_2S gas in a suitable solvent such as, for example, pyridine and in the presence of a base such as, for example, triethylamine,

5 thus obtaining an intermediate of formula (IX-a). This thioamide can then be cyclized with an intermediate of formula (XI) wherein W is a suitable leaving group such as, for example, a halogen, e.g. bromo, in a suitable solvent such as, for example, ethanol. The amino moiety in the resulting 2-thiazolyl derivative of formula (IX-b) can then be further reacted as described hereinabove to form a 6-azauracil ring, thus obtaining a

10 compound of formula (I-a).

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A second pathway to form compounds of formula (I-a) involves first the protecting of the amino moiety in an intermediate of formula (VIII) by introducing a suitable protective group P such as, for example, an alkylcarbonyl group, using art-known protection techniques. In the example of P being a alkylcarbonyl group, the

5 intermediates of formula (VIII) can be reacted with the corresponding anhydride of formula alkyl-C(=O)-O-C(=O)-alkyl in an appropriate solvent such as, for example, toluene. The thus obtained intermediate of formula (X-a) can then be further reacted according to the first pathway described hereinabove. The final step, before formation of the 6-azauracil ring can be initiated after having deprotected the amino moiety using

10 art-known deprotection techniques. In the example of P being a alkylcarbonyl group, the intermediates of formula (X-c) may be deprotected by reacting them in a suitable solvent such as, for example, ethanol, in the presence of an acid such as, for example, hydrochloric acid.

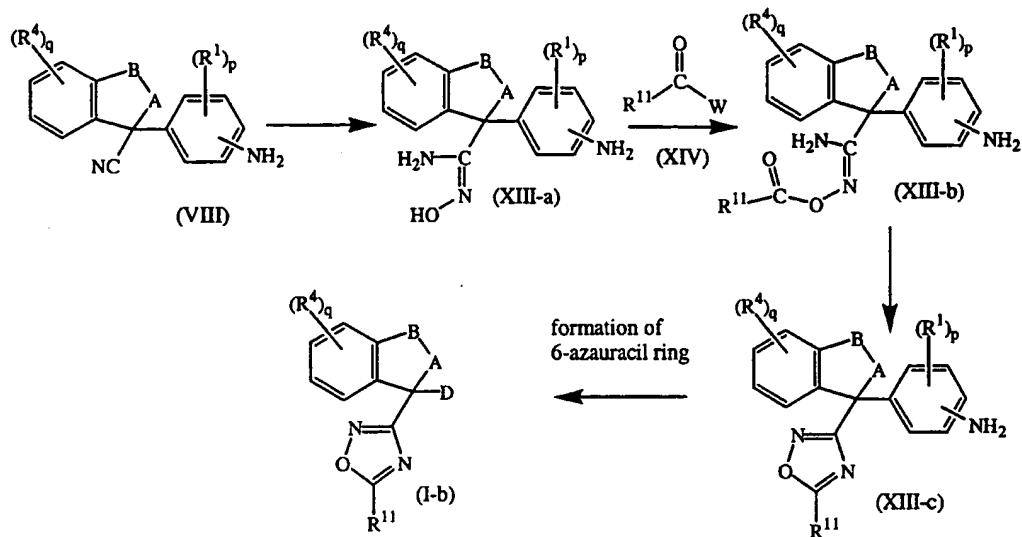
15 A third pathway involves first the formation of the 6-azauracil ring as described hereinabove but starting from an intermediate of formula (VIII), and subsequently reacting the thus formed compound of formula (I) wherein -X¹-R² is cyano, said compounds being represented by formula (I-c), with H₂S and further reacting the compound of formula (I) wherein -X¹-R² is a thioamide, said compounds being

20 represented by formula (I-d), with an intermediate of formula (XI) as described in the first pathway, to finally form a compound of formula (I-a).

Another interesting subgroup within the present invention are those compounds of formula (I) wherein -X¹-R² is an optionally substituted 1,2,4-oxadiazol-3-yl moiety, the optionally substituted 1,2,4-oxadiazol-3-yl moiety can be incorporated at the same stages of the reaction procedure as depicted for the 2-thiazolyl derivatives in scheme 1.

25 For instance, analogous to one of the three pathways shown in scheme 1, compounds of formula (I-b) can be prepared by reacting an intermediate of formula (VIII) as depicted in scheme 2.

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Scheme 2

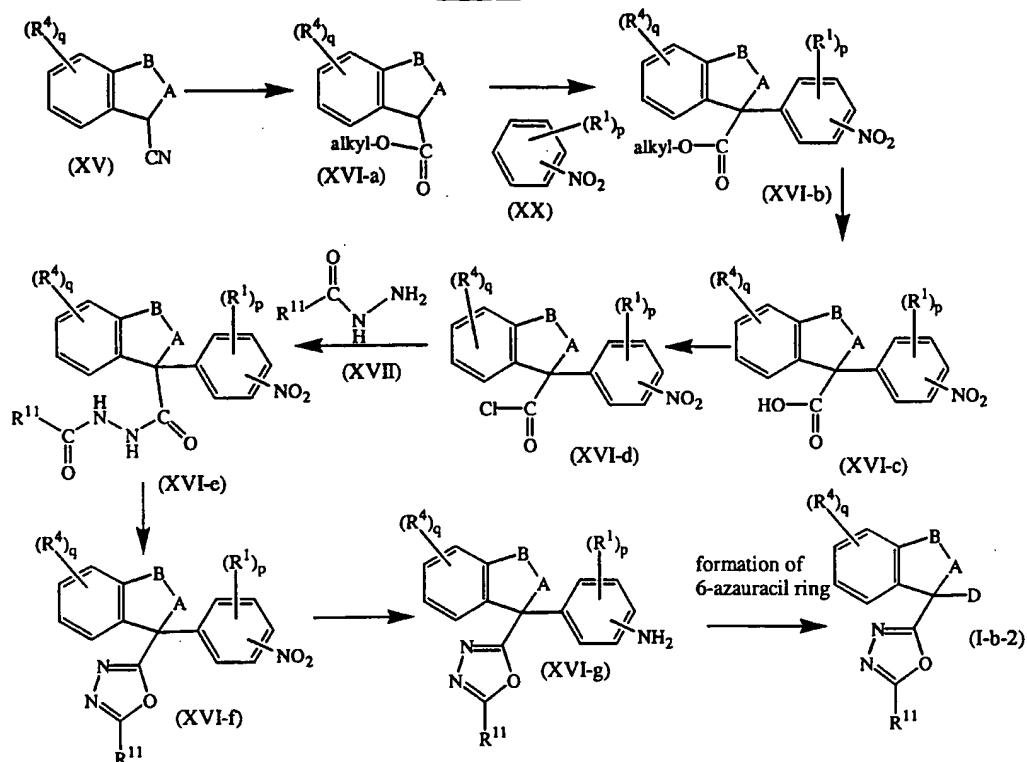
In said scheme 2, the cyano group of an intermediate of formula (VIII) is reacted with hydroxylamine or a functional derivative thereof in a suitable solvent such as, for example, methanol, and in the presence of a base such as, for example, sodium 5 methanolate. The thus formed intermediate of formula (XIII-a) is then reacted with an intermediate of formula (XIV) wherein W is a suitable leaving group such as, for example, a halogen, e.g. chloro, in an appropriate solvent such as, for example, dichloromethane, and in the presence of a base, such as, for example, N,N-(1-methyl-ethyl)ethaneamine. The resulting intermediate of formula (XIII-b) is then cyclized to a 10 3-oxadiazolyl derivative of formula (XIII-c). The amino moiety in the intermediates of formula (XIII-c) can then be transformed to the 6-azauracil ring as described above.

Still another interesting subgroup within the present invention are those compounds of formula (I) wherein $-X^1-R^2$ is an optionally substituted 1,3,4-oxadiazol-2-yl moiety, 15 said compounds being represented by formula (I-b-2).

For instance, compounds of formula (I-b-2) can be prepared as depicted in scheme 3.

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Scheme 3

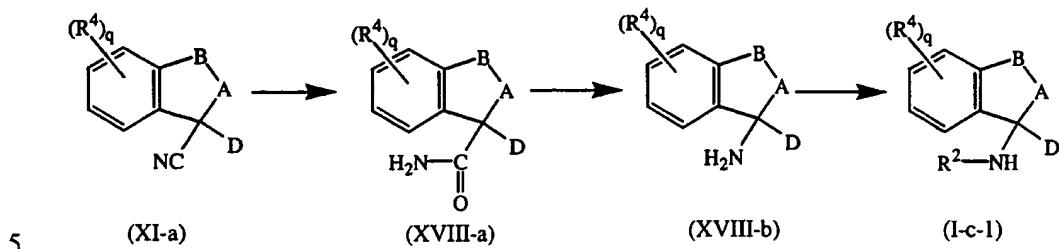


The nitrile moiety in an intermediate of formula (XV) is transformed into a carboxylic acid ester moiety using art-known techniques. For instance, the nitrile derivative may be refluxed in a mixture of sulfuric acid and an alcoholic solvent such as, for example,

- 5 methanol and ethanol. The carboxylic acid ester derivative of formula (XVI-a) may further be reacted with an intermediate of formula (XX) in a reaction-inert solvent such as, for example, N,N-dimethylformamide, and in the presence of a base such as, for example, sodium hydride, thus obtaining an intermediate of formula (XVI-b) of which the ester may be converted into its corresponding carboxylic acid of formula (XVI-c).
- 10 Said intermediate of formula (XVI-c) may be reacted with a chlorinating agent such as, for example, thionyl chloride, to form an acylchloride derivative of formula (XVI-d). Subsequently, the acyl chloride may be reacted with a hydrazine derivative of formula (XVII) in a suitable solvent such as, for example, dichloromethane, and in the presence of a base such as, for example *N,N*-(1-methylethyl)ethaneamine. The thus formed
- 15 intermediate of formula (XVI-e) may be cyclized to a 1,2,4-oxadiazol-2-yl derivative of formula (XVI-f) in the presence of phosphoryl chloride. As a final step before the formation of the 6-azauracil ring as described above, the nitro group in the intermediates of formula (XVI-g) is reduced to an amino group using art-known reduction techniques such as, for instance, reducing the nitro group with hydrogen in
- 20 methanol and in the presence of a catalyst such as Raney Nickel.

Yet another interesting subgroup within the present invention are those compounds of formula (I) wherein $-X^1-R^2$ is $-NH-R^2$, said compounds being represented by formula (I-c-1). Scheme 4 depicts a suitable pathway to obtain compounds of formula (I-c-1).

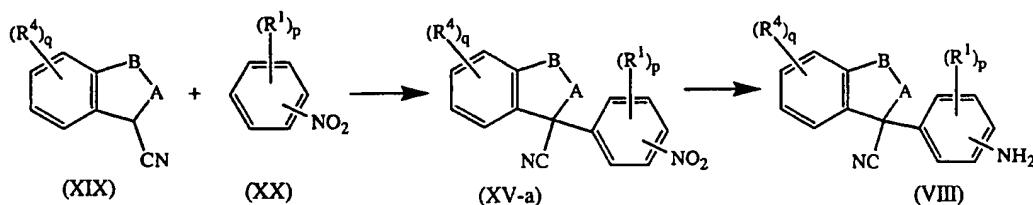
Scheme 4



In said scheme 4, the cyano moiety of an intermediate of formula (XI-a) is hydrolyzed to the corresponding amide using art-known techniques such as, for instance, hydrolysis in the presence of acetic acid and sulfuric acid. The thus formed amide in the intermediates of formula (XVIII-a) can be transformed in an amine using (diacetoxymethyl)benzene or a functional derivative thereof in a suitable solvent such as, for example a mixture of water and acetonitrile. The amine derivative of formula (XVIII-b) can then be reacted with benzotriazol-1-yloxytris(dimethylamino) phosphonium hexafluorophosphate as described in Tetrahedron Letters No.14 (1975) 1219-1222 to obtain a compound, or with a functional derivative thereof such as, for instance, an isothiocyanate, in an appropriate solvent such as, for example, tetrahydrofuran.

Intermediates of formula (VIII) can be prepared as depicted in scheme 5.

Scheme 5



An intermediate of formula (XIX) and an intermediate of formula (XX) may be reacted
20 in a suitable solvent such as, for example, *N,N*-dimethylformamide, in the presence of a
base such as, for example sodium hydride, to form an intermediate of formula (XV-a).
The nitro moiety in the intermediates of formula (XV-a) may be reduced to an amino
group using art-known reduction techniques such as, for example, reducing the nitro
group with hydrogen in methanol and in the presence of a catalyst such as Raney
25 Nickel.

The compounds of formula (I) can also be converted into each other following art-known procedures of functional group transformation such as, for example, those mentioned in PCT/EP98/04191 and the ones exemplified in the experimental part
5 hereinafter.

The compounds of formula (I) may also be converted to the corresponding *N*-oxide forms following art-known procedures for converting a trivalent nitrogen into its *N*-oxide form. Said *N*-oxidation reaction may generally be carried out by reacting the
10 starting material of formula (I) with 3-phenyl-2-(phenylsulfonyl)oxaziridine or with an appropriate organic or inorganic peroxide. Appropriate inorganic peroxides comprise, for example, hydrogen peroxide, alkali metal or earth alkaline metal peroxides, e.g. sodium peroxide, potassium peroxide; appropriate organic peroxides may comprise peroxy acids such as, for example, benzenecarboperoxoic acid or halo substituted
15 benzenecarboperoxoic acid, e.g. 3-chlorobenzenecarboperoxoic acid, peroxyalkanoic acids, e.g. peroxyacetic acid, alkylhydroperoxides, e.g. t-butyl hydroperoxide. Suitable solvents are, for example, water, lower alkanols, e.g. ethanol and the like, hydrocarbons, e.g. toluene, ketones, e.g. 2-butanone, halogenated hydrocarbons, e.g. dichloromethane, and mixtures of such solvents.
20

Pure stereochemically isomeric forms of the compounds of formula (I) may be obtained by the application of art-known procedures. Diastereomers may be separated by physical methods such as selective crystallization and chromatographic techniques, e.g. counter-current distribution, liquid chromatography and the like.
25

Some of the compounds of formula (I) and some of the intermediates in the present invention may contain an asymmetric carbon atom. Pure stereochemically isomeric forms of said compounds and said intermediates can be obtained by the application of art-known procedures. For example, diastereoisomers can be separated by physical
30 methods such as selective crystallization or chromatographic techniques, e.g. counter current distribution, liquid chromatography and the like methods. Enantiomers can be obtained from racemic mixtures by first converting said racemic mixtures with suitable resolving agents such as, for example, chiral acids, to mixtures of diastereomeric salts or compounds; then physically separating said mixtures of diastereomeric salts or
35 compounds by, for example, selective crystallization or chromatographic techniques, e.g. liquid chromatography and the like methods; and finally converting said separated diastereomeric salts or compounds into the corresponding enantiomers. Pure stereochemically isomeric forms may also be obtained from the pure stereochemically

isomeric forms of the appropriate intermediates and starting materials, provided that the intervening reactions occur stereospecifically.

An alternative manner of separating the enantiomeric forms of the compounds of
5 formula (I) and intermediates involves liquid chromatography, in particular liquid chromatography using a chiral stationary phase.

Some of the intermediates and starting materials as used in the reaction procedures mentioned hereinabove are known compounds and may be commercially available or
10 may be prepared according to art-known procedures.

IL-5, also known as eosinophil differentiating factor (EDF) or eosinophil colony stimulating factor (Eo-CSF), is a major survival and differentiation factor for eosinophils and therefore thought to be a key player in eosinophil infiltration into
15 tissues. There is ample evidence that eosinophil influx is an important pathogenic event in bronchial asthma and allergic diseases such as, cheilitis, irritable bowel disease, eczema, urticaria, vasculitis, vulvitis, winterfeet, atopic dermatitis, pollinosis, allergic rhinitis and allergic conjunctivitis; and other inflammatory diseases, such as eosinophilic syndrome, allergic angiitis, eosinophilic fasciitis, eosinophilic pneumonia,
20 PIE syndrome, idiopathic eosinophilia, eosinophilic myalgia, Crohn's disease, ulcerative colitis and the like diseases.

The present compounds also inhibit the production of other chemokines such as monocyte chemotactic protein-1 and -3 (MCP-1 and MCP-3). MCP-1 is known to
25 attract both T-cells, in which IL-5 production mainly occurs, and monocytes, which are known to act synergetically with eosinophils (Carr et al., 1994, Immunology, 91, 3652-3656). MCP-3 also plays a primary role in allergic inflammation as it is known to mobilize and activate basophil and eosinophil leukocytes (Baggiolini et al., 1994, Immunology Today, 15(3), 127-133).

30 The present compounds have no or little effect on the production of other chemokines such as IL-1, IL-2, IL-3, IL-4, IL-6, IL-10, γ -interferon (IFN- γ) and granulocyte-macrophage colony stimulating factor (GM-CSF) indicating that the present IL-5 inhibitors do not act as broad-spectrum immunosuppressives.

35 The selective chemokine inhibitory effect of the present compounds can be demonstrated by *in vitro* chemokine measurements in human blood of which the test results for IL-5 are presented in the experimental part hereinafter. *In vivo* observations such as the inhibition of eosinophilia in mouse ear, the inhibition of blood eosinophilia

in the *Ascaris* mouse model; the reduction of serum IL-5 protein production and splenic IL-5 mRNA expression induced by anti-CD3 antibody in mice and the inhibition of allergen- or Sephadex-induced pulmonary influx of eosinophils in guinea-pig are indicative for the usefulness of the present compounds in the treatment of eosinophil-dependent inflammatory diseases.

5 The present inhibitors of IL-5 production are orally active compounds.

In view of the above pharmacological properties, the compounds of formula (I) can be
10 used as a medicine. In particular, the present compounds can be used in the manufacture of a medicament for treating eosinophil-dependent inflammatory diseases as mentioned hereinabove, more in particular bronchial asthma, atopic dermatitis, allergic rhinitis and allergic conjunctivitis.

15 In view of the utility of the compounds of formula (I), there is provided a method of treating warm-blooded animals, including humans, suffering from eosinophil-dependent inflammatory diseases, in particular bronchial asthma, atopic dermatitis, allergic rhinitis and allergic conjunctivitis. Said method comprises the systemic or topical administration of an effective amount of a compound of formula (I), a *N*-oxide form, a pharmaceutically acceptable addition salt or a possible stereoisomeric form thereof, to warm-blooded animals, including humans.

20 The present invention also provides compositions for treating eosinophil-dependent inflammatory diseases comprising a therapeutically effective amount of a compound of formula (I) and a pharmaceutically acceptable carrier or diluent.

To prepare the pharmaceutical compositions of this invention, a therapeutically effective amount of the particular compound, in base form or addition salt form, as the active ingredient is combined in intimate admixture with a pharmaceutically acceptable
25 carrier, which may take a wide variety of forms depending on the form of preparation desired for administration. These pharmaceutical compositions are desirably in unitary dosage form suitable, preferably, for systemic administration such as oral, percutaneous, or parenteral administration; or topical administration such as via inhalation, a nose spray, eye drops or via a cream, gel, shampoo or the like. For example, in preparing the
30 compositions in oral dosage form, any of the usual pharmaceutical media may be employed, such as, for example, water, glycols, oils, alcohols and the like in the case of oral liquid preparations such as suspensions, syrups, elixirs and solutions: or solid carriers such as starches, sugars, kaolin, lubricants, binders, disintegrating agents and the like in the case of powders, pills, capsules and tablets. Because of their ease in
35

-20-

administration, tablets and capsules represent the most advantageous oral dosage unit form, in which case solid pharmaceutical carriers are obviously employed. For parenteral compositions, the carrier will usually comprise sterile water, at least in large part, though other ingredients, for example, to aid solubility, may be included.

5 Injectable solutions, for example, may be prepared in which the carrier comprises saline solution, glucose solution or a mixture of saline and glucose solution. Injectable suspensions may also be prepared in which case appropriate liquid carriers, suspending agents and the like may be employed. In the compositions suitable for percutaneous administration, the carrier optionally comprises a penetration enhancing agent and/or a
10 suitable wettable agent, optionally combined with suitable additives of any nature in minor proportions, which additives do not cause any significant deleterious effects on the skin. Said additives may facilitate the administration to the skin and/or may be helpful for preparing the desired compositions. These compositions may be administered in various ways, e.g., as a transdermal patch, as a spot-on or as an
15 ointment. As appropriate compositions for topical application there may be cited all compositions usually employed for topically administering drugs e.g. creams, gellies, dressings, shampoos, tinctures, pastes, ointments, salves, powders and the like. Application of said compositions may be by aerosol, e.g. with a propellant such as nitrogen, carbon dioxide, a freon, or without a propellant such as a pump spray, drops,
20 lotions, or a semisolid such as a thickened composition which can be applied by a swab. In particular, semisolid compositions such as salves, creams, gellies, ointments and the like will conveniently be used.

It is especially advantageous to formulate the aforementioned pharmaceutical
25 compositions in dosage unit form for ease of administration and uniformity of dosage. Dosage unit form as used in the specification and claims herein refers to physically discrete units suitable as unitary dosages, each unit containing a predetermined quantity of active ingredient calculated to produce the desired therapeutic effect in association with the required pharmaceutical carrier. Examples of such dosage unit forms are
30 tablets (including scored or coated tablets), capsules, pills, powder packets, wafers, injectable solutions or suspensions, teaspoonfuls, tablespoonfuls and the like, and segregated multiples thereof.

In order to enhance the solubility and/or the stability of the compounds of formula (I) in
35 pharmaceutical compositions, it can be advantageous to employ α -, β - or γ -cyclo-dextrins or their derivatives. Also co-solvents such as alcohols may improve the solubility and/or the stability of the compounds of formula (I) in pharmaceutical

compositions. In the preparation of aqueous compositions, addition salts of the subject compounds are obviously more suitable due to their increased water solubility.

Appropriate cyclodextrins are α -, β -, γ -cyclodextrins or ethers and mixed ethers thereof
5 wherein one or more of the hydroxy groups of the anhydroglucose units of the cyclodextrin are substituted with C₁₋₆alkyl, particularly methyl, ethyl or isopropyl, e.g. randomly methylated β -CD; hydroxyC₁₋₆alkyl, particularly hydroxyethyl, hydroxypropyl or hydroxybutyl; carboxyC₁₋₆alkyl, particularly carboxymethyl or carboxy-ethyl;
10 C₁₋₆alkylcarbonyl, particularly acetyl; C₁₋₆alkyloxycarbonylC₁₋₆alkyl or carboxy-C₁₋₆alkylloxyC₁₋₆alkyl, particularly carboxymethoxypropyl or carboxyethoxypropyl; C₁₋₆alkylcarbonyloxyC₁₋₆alkyl, particularly 2-acetyloxypropyl. Especially noteworthy as complexants and/or solubilizers are β -CD, randomly methylated β -CD, 2,6-dimethyl- β -CD, 2-hydroxyethyl- β -CD, 2-hydroxyethyl- γ -CD, 2-hydroxypropyl- γ -CD and (2-carboxymethoxy)propyl- β -CD, and in particular 2-hydroxypropyl- β -CD
15 (2-HP- β -CD).

The term mixed ether denotes cyclodextrin derivatives wherein at least two cyclodextrin hydroxy groups are etherified with different groups such as, for example, hydroxypropyl and hydroxyethyl.

20 The average molar substitution (M.S.) is used as a measure of the average number of moles of alkoxy units per mole of anhydroglucose. The M.S. value can be determined by various analytical techniques, preferably, as measured by mass spectrometry, the M.S. ranges from 0.125 to 10.
25 The average substitution degree (D.S.) refers to the average number of substituted hydroxyls per anhydroglucose unit. The D.S. value can be determined by various analytical techniques, preferably, as measured by mass spectrometry, the D.S. ranges from 0.125 to 3.
30 Due to their high degree of selectivity as IL-5 inhibitors, the compounds of formula (I) as defined above, are also useful to mark or identify receptors. To this purpose, the compounds of the present invention need to be labelled, in particular by replacing, partially or completely, one or more atoms in the molecule by their radioactive isotopes.
35 Examples of interesting labelled compounds are those compounds having at least one halo which is a radioactive isotope of iodine, bromine or fluorine; or those compounds having at least one ¹¹C-atom or tritium atom.

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One particular group consists of those compounds of formula (I) containing a radioactive halogen atom. In principle, any compound of formula (I) containing a halogen atom is prone for radiolabelling by replacing the halogen atom by a suitable isotope. Suitable halogen radioisotopes to this purpose are radioactive iodides, e.g.

5 ^{122}I , ^{123}I , ^{125}I , ^{131}I ; radioactive bromides, e.g. ^{75}Br , ^{76}Br , ^{77}Br and ^{82}Br , and radioactive fluorides, e.g. ^{18}F . The introduction of a radioactive halogen atom can be performed by a suitable exchange reaction or by using any one of the procedures as described hereinabove to prepare halogen derivatives of formula (I).

10 Another interesting form of radiolabelling is by substituting a carbon atom by a ^{11}C -atom or the substitution of a hydrogen atom by a tritium atom.

Hence, said radiolabelled compounds of formula (I) can be used in a process of specifically marking receptor sites in biological material. Said process comprises the
15 steps of (a) radiolabelling a compound of formula (I), (b) administering this radiolabelled compound to biological material and subsequently (c) detecting the emissions from the radiolabelled compound. The term biological material is meant to comprise every kind of material which has a biological origin. More in particular this term refers to tissue samples, plasma or body fluids but also to animals, specially warm-blooded
20 animals, or parts of animals such as organs.

The radiolabelled compounds of formula (I) are also useful as agents for screening whether a test compound has the ability to occupy or bind to a particular receptor site. The degree to which a test compound will displace a compound of formula (I) from such a particular receptor site will show the test compound ability as either an agonist,
25 an antagonist or a mixed agonist/antagonist of said receptor.

When used in *in vivo* assays, the radiolabelled compounds are administered in an appropriate composition to an animal and the location of said radiolabelled compounds is detected using imaging techniques, such as, for instance, Single Photon Emission Computerized Tomography (SPECT) or Positron Emission Tomography (PET) and the
30 like. In this manner the distribution of the particular receptor sites throughout the body can be detected and organs containing said receptor sites can be visualized by the imaging techniques mentioned hereinabove. This process of imaging an organ by administering a radiolabelled compound of formula (I) and detecting the emissions from the radioactive compound also constitutes a part of the present invention.

35

In general, it is contemplated that a therapeutically effective daily amount would be from 0.01 mg/kg to 50 mg/kg body weight, in particular from 0.05 mg/kg to 10 mg/kg body weight. A method of treatment may also include administering the active

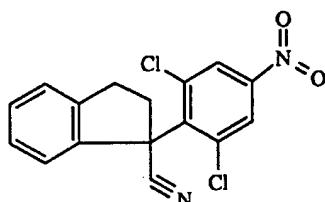
ingredient on a regimen of between two or four intakes per day.

Experimental part

A. Preparation of the intermediate compounds

Example A1

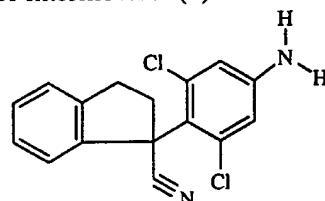
a) Preparation of



intermediate (1)

5 NaH (80% in oil; 0.0953 mol) was added portionwise at 0°C under N_2 flow to a solution of 2,3-dihydro-1*H*-Indene-1-carbonitrile (0.0733 mol) in *N,N*-dimethylformamide (100ml). The mixture was stirred for 30 minutes. A solution of 1,2,3-trichloro-5-nitrobenzene (0.11 mol) in *N,N*-dimethylformamide (50ml) was added dropwise while the temperature was kept below 5°C . The mixture was stirred at 0°C for 30 minutes. H_2O was added. The mixture was acidified with HCl 3N. The reaction was carried out again using the same quantities. Both mixtures were combined and ethyl acetate was added. The precipitate was filtered off, washed with ethylacetate and dried, to give residue 1 (2.1g). The filtrate was decanted. The organic layer was dried, filtered and the solvent was evaporated. The residue was taken up in diisopropyl ether. The precipitate was filtered off and dried, to give residue 2 (7.6g). The filtrate was evaporated. The residue (60g) was purified by column chromatography over silica gel (eluent: $\text{CH}_2\text{Cl}_2/\text{cyclohexane}$ 50/50). The pure fractions were collected and the solvent was evaporated, to give residue 3 (11.3g). Residue 1, 2 and 3 were combined, yielding 21g (44%) of intermediate (1).

b) Preparation of

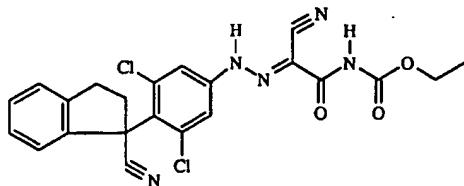


intermediate (2)

20 A mixture of intermediate (1) (0.063 mol) and TiCl_3 (15% in H_2O ; 0.408 mol) in tetrahydrofuran (200ml) was stirred at room temperature overnight. H_2O was added and the mixture was extracted twice with CH_2Cl_2 . The combined organic layer was washed with K_2CO_3 10%, dried, filtered and the solvent was evaporated, yielding 18g (94%) of intermediate (2).

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c) Preparation of

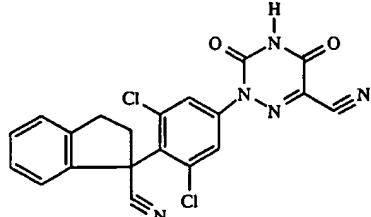


intermediate (3)

A mixture of NaNO₂ (0.059 mol) in H₂O (70ml) was added dropwise at 5°C to a solution of intermediate (2) (0.0593 mol) in acetic acid (130ml) and concentrated HCl (25ml). The mixture was stirred at 5°C for 30 min and then added dropwise at 5°C to a mixture of (cyanoacetyl)-carbamic acid ethyl ester (0.082 mol) and sodium acetate

5 (180g) in H₂O (1800ml). The mixture was stirred at 5-10°C for 90 minutes. The precipitate was filtered off, washed with H₂O and taken up in CH₂Cl₂ and a small amount of CH₃OH. The organic layer was separated, dried, filtered and the solvent was evaporated, yielding 27.1g of intermediate (3).

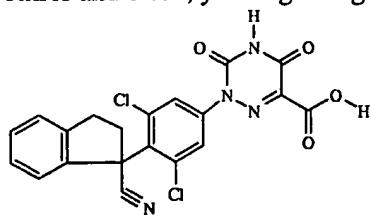
d) Preparation of



intermediate (4)

A mixture of intermediate (3) (0.0593 mol) and potassium acetate (0.0622 mol) in 10 acetic acid (160ml) was stirred and refluxed for 3 hours and then cooled to room temperature. H₂O (300ml) was added. The precipitate was filtered off, washed with H₂O and diisopropyl ether and dried, yielding 25.3g of intermediate (4).

e) Preparation of

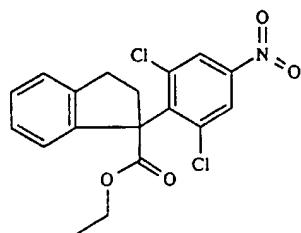


intermediate (5)

A mixture of intermediate (4) (0.0593 mol) in acetic acid (250ml) and HCl 12N (75ml) was stirred and refluxed for 3 hours, then cooled to room temperature and poured out 15 into H₂O (600ml). The precipitate was filtered off, washed with H₂O and diisopropyl ether and dried, yielding 26.4g of intermediate (5).

Example A2

a) Preparation of

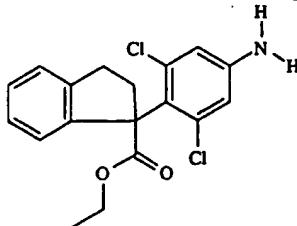


intermediate (6)

-25-

Analogous to the procedure described in example A.1.a.

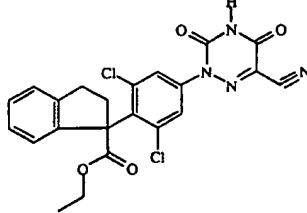
b) Preparation of



intermediate (7)

A mixture of intermediate (6) (0.0144 mol) in methanol (50ml) and tetrahydrofuran (20ml) was hydrogenated under a 3 bar pressure for 75 minutes with Raney Nickel (5g) as a catalyst in the presence of thiophene (10 % in ethanol; 0.5ml). After uptake of H₂ (3 equivalents), the catalyst was filtered through celite, washed with CH₂Cl₂ and the filtrate was evaporated, yielding 4.6g (91%) of intermediate (7).

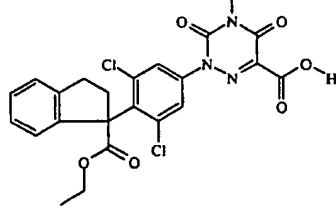
c) Preparation of



intermediate (8)

A mixture of intermediate (7) (0.013 mol) in acetic acid (42ml) and HCl (12 N; 3.6ml) was stirred at room temperature for 15 minutes and then cooled under N₂ flow to 10°C. A solution of NaNO₂ (0.013 mol) in H₂O (3ml) was added dropwise. The mixture was stirred at 10°C for 90 minutes. (Cyanoacetyl)-carbamic acid, ethyl ester (0.0143 mol) and sodium acetate (0.0455 mol) were added. The mixture was stirred at room temperature for 1 hour. Sodium acetate (0.013 mol) was added again. The mixture was stirred at 110°C for 2 hours and allowed to cool to room temperature. H₂O was added. A gum was filtered off and taken up in CH₂Cl₂. The organic solution was dried, filtered and the solvent was evaporated, yielding intermediate (8).

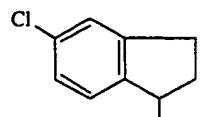
d) Preparation of



intermediate (9)

Analogous to the procedure described in example A.1.e.

Example A3



Preparation of

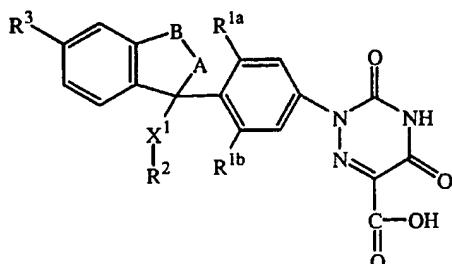
intermediate (10)

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A mixture of 5-chloro-2,3-dihydro-1*H*-indene-1-carbonitrile (0.118 mol), prepared according to the procedure described in J. Med. Chem., 1991, 34(4), 1307 in ethanol (90ml) and concentrated H₂SO₄ (28ml) was stirred and refluxed for 5 hours, poured out into H₂O and extracted with ethylacetate. The organic solution was washed with H₂O, dried, filtered and the solvent was evaporated, yielding 24.4g (92%) of intermediate (10).

The following intermediates were prepared according to the procedure described in example A2.

10 Table 1

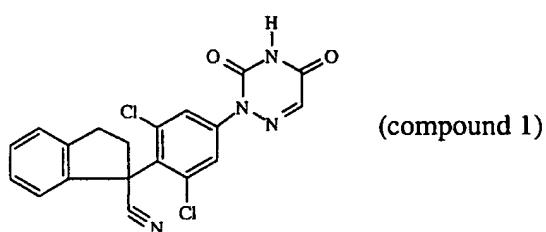


Int. No.	B-A	X ¹ -R ²	R ^{1a}	R ^{1b}	R ³
11	-(CH ₂) ₂ -	CN	H	H	H
12	-(CH ₂) ₂ -	CN	OCH ₃	H	H
13	-(CH ₂) ₂ -	CN	Cl	H	H
14	-(CH ₂) ₃ -	CN	Cl	H	H
15	-(CH ₂) ₂ -	CN	Cl	Cl	Cl
16	-O-(CH ₂) ₂ -	CN	Cl	Cl	H
17	-O-(CH ₂) ₂ -	-C(=O)-OC ₂ H ₅	Cl	Cl	H
18	-(CH ₂) ₂ -	-C(=O)-OC ₂ H ₅	Cl	Cl	Cl

B. Preparation of the final compounds

Example B1

a) Preparation of



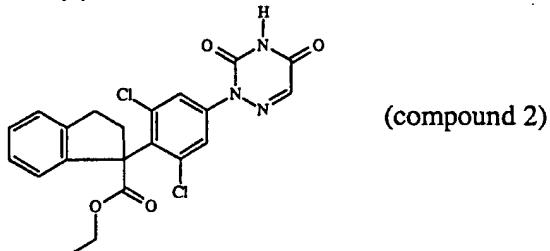
A mixture of intermediate (5) (0.0593 mol) in mercaptoacetic acid (40ml) was stirred at 175°C for 3 hours. The mixture was cooled to room temperature and poured out on ice. CH₂Cl₂ was added. The mixture was basified with K₂CO₃ 10% and decanted. The

-27-

organic layer was dried, filtered and the solvent was evaporated. The residue was purified by column chromatography over silica gel (eluent: CH₂Cl₂/CH₃OH 99/1). The pure fractions were collected and the solvent was evaporated. Part of this residue (1.2g) was crystallized from CH₂Cl₂. The precipitate was filtered off and dried,

5 yielding 0.81g of compound (1).

b) Preparation of

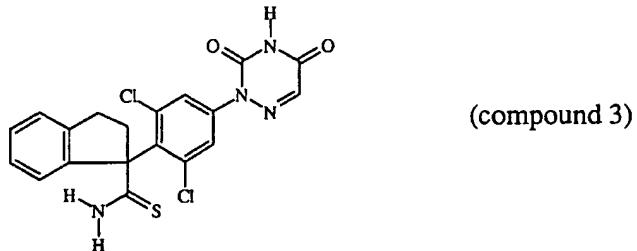


A mixture of intermediate (9) (0.0092 mol) and mercaptoacetic acid (0.77ml) in acetic acid (9ml) was stirred at 110°C for 18 hours, brought to room temperature and taken up in CH₂Cl₂. K₂CO₃ 10% and K₂CO₃ solid were added. The organic layer was separated, dried, filtered and the solvent was evaporated. The residue was purified by

10 column chromatography over silica gel (eluent: CH₂Cl₂/CH₃OH 98.5/1.5). The pure fractions were collected and the solvent was evaporated, yielding 0.85g (20%) of compound (2) (mp. 88°C).

Example B2

Preparation of



A mixture of compound (1) (0.00925 mol) and *N,N*-di(1-methylethyl)ethanamine

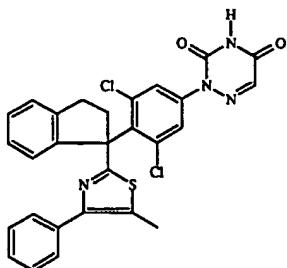
15 (0.00925 mol) in pyridine (50ml) was stirred at 60°C. H₂S gas was bubbled through the mixture for 16 hours. The mixture was allowed to cool to room temperature. The solvent was evaporated. The residue was taken up in CH₂Cl₂. The organic solution was washed twice with HCl 3N, dried, filtered and the solvent was evaporated. The residue was purified by column chromatography over silica gel (eluent: CH₂Cl₂/CH₃OH 98/2). The pure fractions were collected and the solvent was evaporated, yielding 1.5g

20 (37%) of compound (3).

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Example B3

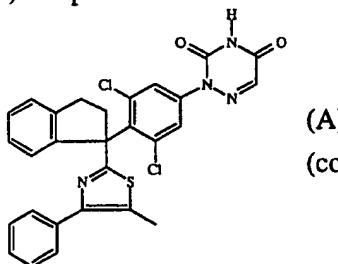
a) Preparation of



(compound 4)

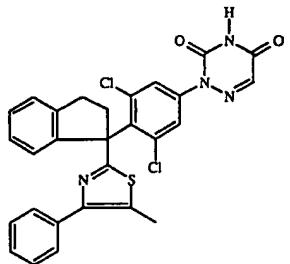
A mixture of compound (3) (0.00334 mol) and 2-bromo-1-phenyl-1-propanone (0.00401 mol) in ethanol (40ml) was stirred and refluxed for 3 hours. H₂O was added and the mixture was extracted twice with CH₂Cl₂. The combined organic layer was dried, filtered and the solvent was evaporated. The residue was purified by column chromatography over silica gel (eluent: CH₂Cl₂/CH₃OH 99/1). The pure fractions were collected and the solvent was evaporated. The residue was crystallized from CH₂Cl₂, cyclohexane and diisopropyl ether. The precipitate was filtered off and dried, yielding 0.98g (53%) of compound (4) (mp. 237°C).

b) Preparation of



(A)

(compound 5) and



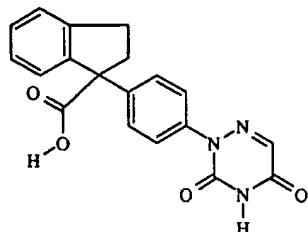
(B)

(compound 6)

Compound (4) (0.0122 mol) was separated into its enantiomers by column chromatography (eluent: hexane/ethanol/acetic acid 75/25/0.1; column: CHIRACEL OD 20 μm). Two pure fractions were collected and their solvents were evaporated, yielding 2.6g of the (A) form (compound (5); mp. 122°C) and 2.3g of the (B) form (compound (6); mp. 138°C).

Example B4

Preparation of



(compound 7)

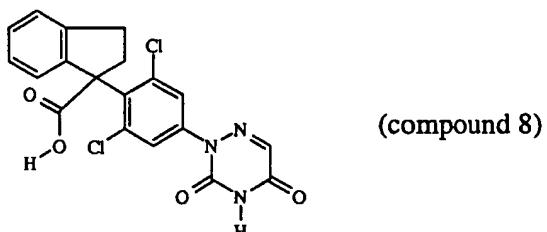
A mixture of compound (17) (0.0109 mol) in HCl 12N (100ml) and acetic acid (30ml) was stirred and refluxed for 3 days, then brought to room temperature and poured out

-29-

into H₂O. The precipitate was filtered off, washed with H₂O and taken up in CH₂Cl₂. The organic solution was dried, filtered and the solvent was evaporated, yielding 2.6g (68%) of compound (7).

Example B5

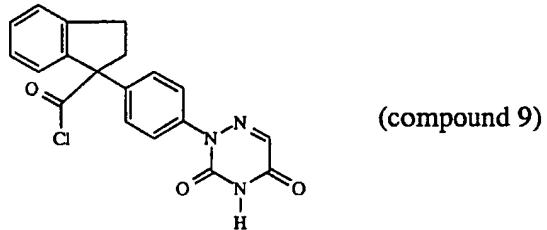
Preparation of



5 A mixture of compound (2) (0.064 mol) in HBr in acetic acid (200ml) and aqueous HBr (140ml) was stirred and refluxed for 24 hours and then brought to room temperature. H₂O was added. The precipitate was filtered off, washed with H₂O and taken up in CH₂Cl₂ and a small amount of CH₃OH. The organic solution was dried, filtered and the solvent was evaporated, yielding 21.1g (78%) of compound (8).

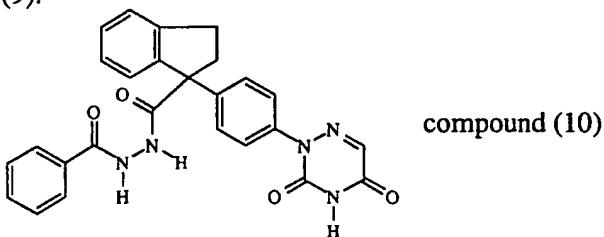
10 Example B6

a) Preparation of



A mixture of compound (7) (0.00744 mol) in SOCl₂ (15ml) was stirred and refluxed for 90 minutes and then brought to room temperature. The solvent was evaporated, yielding compound (9).

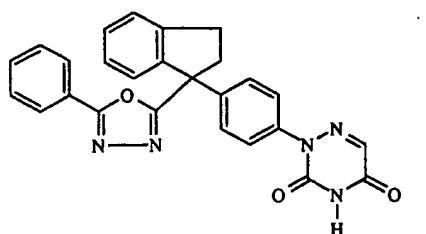
b) Preparation of



15 A mixture of compound (9) (0.00744 mol) in THF (30ml) was added dropwise at 10°C under N₂ flow to a solution of hydrazide benzoic acid (0.0082 mol) and *N,N*-diethyl-ethanamine (0.0298 mol) in CH₂Cl₂ (20ml). The mixture was brought to room temperature and stirred for 2 hours. H₂O was added. The mixture was acidified with HCl 3N and extracted with CH₂Cl₂. The organic layer was separated, dried, filtered and the solvent was evaporated, yielding 4g of compound (10).

-30-

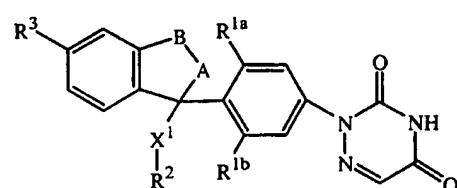
c) Preparation of



(compound 11)

A mixture of compound (10) (0.00744 mol) in POCl_3 (20ml) was stirred and refluxed for 2 hours and then brought to room temperature. The solvent was evaporated. The residue was taken up in CH_2Cl_2 . The organic solution was washed with H_2O , dried, filtered and the solvent was evaporated. The residue was purified by column

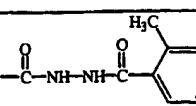
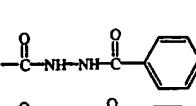
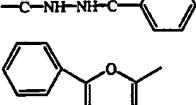
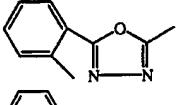
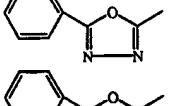
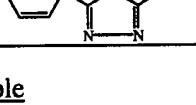
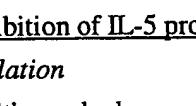
- 5 chromatography over silica gel (eluent: cyclohexane/ethyl acetate 60/40). The pure fractions were collected and the solvent was evaporated. The residue was taken up in diisopropyl ether. The precipitate was filtered off and dried, yielding 0.69g (20%) of compound (11) (mp. 128°C).
- 10 Table 2 lists the compounds that were prepared according to one of the above examples.

Table 2

Co. No.	Ex. No.	B-A	X^1-R^2	R^{1a}	R^{1b}	R^3	Physical data (mp. in °C)
1	B1a	$-(\text{CH}_2)_2-$	CN	Cl	Cl	H	>250°C
2	B1b	$-(\text{CH}_2)_2-$	$-\text{C}(=\text{O})-\text{O}-\text{C}_2\text{H}_5$	Cl	Cl	H	88°C
3	B2	$-(\text{CH}_2)_2-$	$-\text{C}(=\text{S})-\text{NH}_2$	Cl	Cl	H	
4	B3a	$-(\text{CH}_2)_2-$		Cl	Cl	H	237°C
5	B3b	$-(\text{CH}_2)_2-$		Cl	Cl	H	122°C; (A)
6	B3b	$-(\text{CH}_2)_2-$		Cl	Cl	H	138°C; (B)
7	B4	$-(\text{CH}_2)_2-$	$-\text{C}(=\text{O})-\text{OH}$	H	H	H	

Co. No.	Ex. No.	B-A	X ¹ -R ²	R ^{1a}	R ^{1b}	R ³	Physical data (mp. in °C)
8	B5	-(CH ₂) ₂ -	-C(=O)-OH	Cl	Cl	H	
9	B6a	-(CH ₂) ₂ -	-C(=O)-Cl	H	H	H	
10	B6b	-(CH ₂) ₂ -		H	H	H	
11	B6c	-(CH ₂) ₂ -		H	H	H	128°C
12	B1a	-(CH ₂) ₂ -	CN	Cl	Cl	Cl	240°C
13	B1a	-O-(CH ₂) ₂ -	CN	Cl	Cl	H	
14	B1a	-(CH ₂) ₃ -	CN	Cl	H	H	
15	B1a	-O-(CH ₂) ₂ -	-C(=O)-O-C ₂ H ₅	Cl	Cl	H	
16	B1a	-(CH ₂) ₂ -	-C(=O)-O-C ₂ H ₅	Cl	Cl	Cl	
17	B1b	-(CH ₂) ₂ -	-CN	H	H	H	238°C
18	B1b	-(CH ₂) ₂ -	-CN	OCH ₃	H	H	250°C
19	B1b	-(CH ₂) ₂ -	-CN	Cl	H	H	176°C
20	B2	-(CH ₂) ₂ -	-C(=S)-NH ₂	H	H	H	
21	B2	-(CH ₂) ₂ -	-C(=S)-NH ₂	Cl	H	H	
22	B2	-(CH ₂) ₂ -	-C(=S)-NH ₂	OCH ₃	H	H	
23	B2	-(CH ₂) ₂ -	-C(=S)-NH ₂	Cl	Cl	Cl	
24	B2	-O-(CH ₂) ₂ -	-C(=S)-NH ₂	Cl	Cl	H	
25	B2	-(CH ₂) ₃ -	-C(=S)-NH ₂	Cl	H	H	
26	B3a	-(CH ₂) ₂ -		H	H	H	208°C
27	B3a	-(CH ₂) ₂ -		Cl	H	H	218°C
28	B3a	-(CH ₂) ₂ -		Cl	Cl	H	202°C
29	B3a	-(CH ₂) ₂ -		Cl	Cl	H	122°C
30	B3a	-(CH ₂) ₂ -		Cl	Cl	H	130°C

Co. No.	Ex. No.	B-A	X ¹ -R ²	R ^{1a}	R ^{1b}	R ³	Physical data (mp. in °C)
31	B3a	-(CH ₂) ₂ -		Cl	Cl	H	96°C
32	B3a	-(CH ₂) ₂ -		OCH ₃	H	H	184°C
33	B3a	-(CH ₂) ₂ -		Cl	Cl	Cl	184°C
34	B3a	-O-(CH ₂) ₂ -		Cl	Cl	H	170°C
35	B3a	-(CH ₂) ₂ -		Cl	Cl	H	130°C
36	B3a	-(CH ₂) ₂ -		Cl	Cl	H	150°C
37	B3a	-(CH ₂) ₃ -		Cl	H	H	176°C
38	B3a	-(CH ₂) ₂ -		Cl	Cl	Cl	156°C
39	B3a	-(CH ₂) ₂ -		Cl	Cl	Cl	128°C
40	B5	-O-(CH ₂) ₂ -	-C(=O)-OH	Cl	Cl	H	
41	B5	-(CH ₂) ₂ -	-C(=O)-OH	Cl	Cl	Cl	
42	B6a	-(CH ₂) ₂ -	-C(=O)-Cl	Cl	Cl	H	
43	B6a	-O-(CH ₂) ₂ -	-C(=O)-Cl	Cl	Cl	H	
44	B6a	-(CH ₂) ₂ -	-C(=O)-Cl	Cl	Cl	Cl	
45	B6b	-(CH ₂) ₂ -		Cl	Cl	H	

Co. No.	Ex. No.	B-A	X ¹ -R ²	R ^{1a}	R ^{1b}	R ³	Physical data (mp. in °C)
46	B6b	-(CH ₂) ₂ -		Cl	Cl	H	
47	B6b	-O-(CH ₂) ₂ -		Cl	Cl	H	
48	B6b	-(CH ₂) ₂ -		Cl	Cl	Cl	
49	B6c	-(CH ₂) ₂ -		Cl	Cl	H	250°C
50	B6c	-(CH ₂) ₂ -		Cl	Cl	H	160°C
51	B6c	-O-(CH ₂) ₂ -		Cl	Cl	H	>250°C
52	B6c	-(CH ₂) ₂ -		Cl	Cl	Cl	140°C

C. Pharmacological example**Example C.1 : *in vitro* inhibition of IL-5 production in human blood****Human whole blood stimulation**

Peripheral blood from healthy male donors was drawn into heparinized syringes (12.5 U heparin/ml). Blood samples were three-fold diluted in RPMI 1640 medium (Life Technologies, Belgium) supplemented with 2 mM L-glutamine, 100 U/ml penicillin and 100 mg/ml streptomycin, and 300 ml fractions were distributed in 24-well multidisc plates. Blood samples were preincubated (60 minutes at 37°C) in a humidified 6% CO₂-atmosphere with 100 ml of drug solvent (final concentration 5 0.02% dimethylsulfoxide in RPMI 1640) or with 100 ml of an appropriate dose of test compound before being stimulated by the addition of 100 ml of phytohemagglutinin HA17 (Murex, UK) at a final concentration of 2 mg/ml. After 48 hours, cell-free supernatant fluids were collected by centrifugation and stored at -70°C until tested for the presence of IL-5.

10 0.02% dimethylsulfoxide in RPMI 1640) or with 100 ml of an appropriate dose of test compound before being stimulated by the addition of 100 ml of phytohemagglutinin HA17 (Murex, UK) at a final concentration of 2 mg/ml. After 48 hours, cell-free supernatant fluids were collected by centrifugation and stored at -70°C until tested for the presence of IL-5.

15 **IL-5 measurements**

IL-5 measurements were conducted as described in Van Wauwe et al. (1996, Inflamm Res, 45, 357-363) on page 358 using ELISA.

Table 3 lists the percentage inhibition of IL-5 production (column "% inh") at a test dose of 1 x 10⁻⁶ M for the compounds of the present invention.

Table 3

Co. No.	% inh.	Co. No.	% inh.	Co. No.	% inh.
1	70.5	26	73	36	89
2	63	27	89	37	85
4	89.33	28	93	38	75
5	88	29	91	39	90
6	91	30	90	49	80
10	16	31	94	50	52
12	74	32	54	51	79
17	7	33	86	52	84
18	16	34	90		
19	30	35	83		

D. Composition examples

The following formulations exemplify typical pharmaceutical compositions suitable for systemic or topical administration to animal and human subjects in accordance with the

5 present invention.

"Active ingredient" (A.I.) as used throughout these examples relates to a compound of formula (I) or a pharmaceutically acceptable addition salt thereof.

Example D.1 : film-coated tabletsPreparation of tablet core

10 A mixture of A.I. (100 g), lactose (570 g) and starch (200 g) was mixed well and thereafter humidified with a solution of sodium dodecyl sulfate (5 g) and polyvinyl-pyrrolidone (10 g) in about 200 ml of water. The wet powder mixture was sieved, dried and sieved again. Then there was added microcrystalline cellulose (100 g) and hydrogenated vegetable oil (15 g). The whole was mixed well and compressed into 15 tablets, giving 10.000 tablets, each comprising 10 mg of the active ingredient.

Coating

To a solution of methyl cellulose (10 g) in denatured ethanol (75 ml) there was added a solution of ethyl cellulose (5 g) in CH₂Cl₂ (150 ml). Then there were added CH₂Cl₂ (75 ml) and 1,2,3-propanetriol (2.5 ml). Polyethylene glycol (10 g) was molten and dissolved in 20 dichloromethane (75 ml). The latter solution was added to the former and then there were added magnesium octadecanoate (2.5 g), polyvinyl-pyrrolidone (5 g) and concentrated color suspension (30 ml) and the whole was homogenated. The tablet cores were coated with the thus obtained mixture in a coating apparatus.

Example D.2 : 2% topical cream

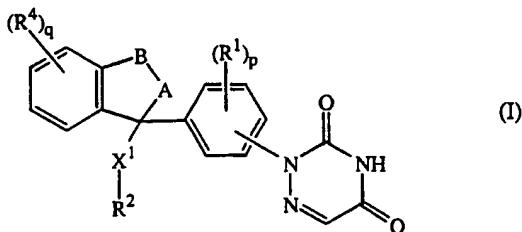
25 To a solution of hydroxypropyl β-cyclodextrine (200 mg) in purified water is added A.I. (20 mg) while stirring. Hydrochloric acid is added until complete dissolution and

-35-

next sodium hydroxide is added until pH 6.0. While stirring, glycerol (50 mg) and polysorbate 60 (35 mg) are added and the mixture is heated to 70°C. The resulting mixture is added to a mixture of mineral oil (100 mg), stearyl alcohol (20 mg), cetyl alcohol (20 mg), glycerol monostearate (20 mg) and sorbate 60 (15 mg) having a
5 temperature of 70°C while mixing slowly. After cooling down to below 25°C, the rest of the purified water q.s. ad 1 g is added and the mixture is mixed to homogenous.

Claims

1. A compound of formula



a *N*-oxides, a pharmaceutically acceptable addition salts or a stereochemically
5 isomeric forms thereof, wherein :

p represents an integer being 0, 1, 2 or 3;
q represents an integer being 0, 1, 2, 3 or 4;
-A-B- represents $-(CH_2)_t-$, $-(CH_2)_t-O-$, $-(CH_2)_t-S(=O)_u-$ or $-(CH_2)_t-NR^3-$;
r represents 2, 3 or 4;

10 each t independently represents 1, 2 or 3;
u represents 0, 1 or 2;
 X^1 represents O, S, NR^3 or a direct bond;
each R^1 independently represents C₁₋₆alkyl, halo, polyhaloC₁₋₆alkyl, hydroxy, mercapto,
C₁₋₆alkyloxy, C₁₋₆alkylthio, C₁₋₆alkylcarbonyloxy, aryl, cyano, nitro, Het³, R⁶,

15 NR⁷R⁸ or C₁₋₄alkyl substituted with Het³, R⁶ or NR⁷R⁸;
each R^4 independently represents C₁₋₆alkyl, halo, polyhaloC₁₋₆alkyl, hydroxy, mercapto,
C₁₋₆alkyloxy, C₁₋₆alkylthio, C₁₋₆alkylcarbonyloxy, aryl, cyano, nitro, Het³, R⁶,
NR⁷R⁸ or C₁₋₄alkyl substituted with Het³, R⁶ or NR⁷R⁸;

20 R² represents aryl, Het¹, C₃₋₇cycloalkyl, cyano, C₁₋₆alkyl, -C(=Q)-X²-R¹⁵ or C₁₋₆alkyl
substituted with one or two substituents selected from hydroxy, cyano, amino, mono-
or di(C₁₋₄alkyl)amino, C₁₋₆alkyloxy, C₁₋₆alkylsulfonyloxy, C₁₋₆alkyloxycarbonyl,
C₃₋₇cycloalkyl, aryl, aryloxy, arylthio, Het¹, Het¹oxy, Het¹thio and -C(=Q)-X²-R¹⁵;
each R³ independently represents hydrogen or C₁₋₄alkyl;
each R¹⁵ independently represents hydrogen, C₁₋₆alkyl, C₃₋₇cycloalkyl, aryl or C₁₋₆alkyl

25 each R¹⁵ substituted with aryl, halo, hydroxy or Het¹;
where X² is a direct bond, R¹⁵ may also be halo or Het¹;
where X² is NR⁵, R¹⁵ may also be hydroxy;
where X² is C(=O)-NH-NH or NH-NH-C(=O), R¹⁵ may be replaced by R¹¹;
each Q independently represents O, S or NR³;

30 each X² independently represents O, S, NR⁵, C(=O)-NH-NH, NH-NH-C(=O) or a direct
bond;
R⁵ represents hydrogen, C₁₋₆alkyl, C₁₋₆alkyloxy or arylC₁₋₆alkyl;

each R⁶ independently represents C₁₋₆alkylsulfonyl, aminosulfonyl, mono- or di-(C₁₋₄alkyl)aminosulfonyl, mono- or di(benzyl)aminosulfonyl, polyhaloC₁₋₆alkylsulfonyl, C₁₋₆alkylsulfinyl, phenylC₁₋₄alkylsulfonyl, piperazinylsulfonyl, aminopiperidinylsulfonyl, piperidinylaminosulfonyl, N-C₁₋₄alkyl-N-piperidinylaminosulfonyl or mono- or di(C₁₋₄alkyl)aminoC₁₋₄alkylsulfonyl;

5 each R⁷ and each R⁸ are independently selected from hydrogen, C₁₋₄alkyl, hydroxy-C₁₋₄alkyl, dihydroxyC₁₋₄alkyl, aryl, arylC₁₋₄alkyl, C₁₋₄alkyloxyC₁₋₄alkyl, C₁₋₄alkylcarbonyl, aminocarbonyl, arylcarbonyl, Het³carbonyl, C₁₋₄alkylcarbonyloxy-C₁₋₄alkylcarbonyl, hydroxyC₁₋₄alkylcarbonyl, C₁₋₄alkyloxycarbonylcarbonyl, mono- or di(C₁₋₄alkyl)aminoC₁₋₄alkyl, arylaminocarbonyl, arylaminothiocarbonyl, Het³amino-carbonyl, Het³aminothiocarbonyl, C₃₋₇cycloalkyl, pyridinylC₁₋₄alkyl, C₁₋₄alkanediyl-C(=O)-O-R¹⁴, -C(=O)-O-R¹⁴, -Y-C₁₋₄alkanediyl-C(=O)-O-R¹⁴, Het³ and R⁶;

10 each Y independently represents O, S, NR³, or S(O)₂;

R⁹ and R¹⁰ are each independently selected from hydrogen, C₁₋₄alkyl, hydroxyC₁₋₄alkyl, dihydroxyC₁₋₄alkyl, phenyl, phenylC₁₋₄alkyl, C₁₋₄alkyloxyC₁₋₄alkyl, C₁₋₄alkylcarbonyl, aminocarbonyl, phenylcarbonyl, Het³carbonyl, C₁₋₄alkylcarbonyloxyC₁₋₄alkylcarbonyl, hydroxyC₁₋₄alkylcarbonyl, C₁₋₄alkyloxycarbonylcarbonyl, mono- or di(C₁₋₄alkyl)aminoC₁₋₄alkyl, phenylaminocarbonyl, phenylaminothiocarbonyl, Het³aminocarbonyl, Het³aminothiocarbonyl, C₃₋₇cycloalkyl, pyridinylC₁₋₄alkyl, C₁₋₄alkanediyl-C(=O)-O-R¹⁴, -C(=O)-O-R¹⁴, -Y-C₁₋₄alkanediyl-C(=O)-O-R¹⁴, Het³

15 and R⁶;

20 each R¹¹ independently being selected from hydroxy, mercapto, cyano, nitro, halo, trihalomethyl, C₁₋₄alkyloxy, formyl, trihaloC₁₋₄alkylsulfonyloxy, R⁶, NR⁷R⁸, C(=O)NR⁷R⁸, -C(=O)-O-R¹⁴, -Y-C₁₋₄alkanediyl-C(=O)-O-R¹⁴, aryl, aryloxy, arylcarbonyl, C₃₋₇cycloalkyl, C₃₋₇cycloalkyloxy, phthalimide-2-yl, Het³, Het⁴ and C(=O)Het³;

25 R¹² and R¹³ are each independently selected from hydrogen, C₁₋₄alkyl, hydroxyC₁₋₄alkyl, dihydroxyC₁₋₄alkyl, phenyl, phenylC₁₋₄alkyl, C₁₋₄alkyloxyC₁₋₄alkyl, C₁₋₄alkylcarbonyl, phenylcarbonyl, C₁₋₄alkylcarbonyloxyC₁₋₄alkylcarbonyl, hydroxyC₁₋₄alkylcarbonyl, C₁₋₄alkyloxycarbonylcarbonyl, mono- or di(C₁₋₄alkyl)aminoC₁₋₄alkyl, phenylaminocarbonyl, phenylaminothiocarbonyl, C₃₋₇cycloalkyl, pyridinylC₁₋₄alkyl, C₁₋₄alkanediyl-C(=O)-O-R¹⁴, -C(=O)-O-R¹⁴, -Y-C₁₋₄alkanediyl-C(=O)-O-R¹⁴ and R⁶;

30 each R¹⁴ independently represents hydrogen, C₁₋₄alkyl, C₃₋₇cycloalkyl, aminocarbonylmethylene, mono- or di(C₁₋₄alkyl)aminocarbonylmethylene, mono- or di(C₃₋₇cycloalkyl)aminocarbonylmethylene, azetidin-1-ylcarbonylmethylene, pyrrolidin-1-ylcarbonylmethylene, piperidin-1-ylcarbonylmethylene or homopiperidin-1-ylcarbonylmethylene;

aryl represents phenyl optionally substituted with one, two or three substituents each independently selected from nitro, azido, cyano, halo, hydroxy, C₁₋₄alkyl, C₃₋₇cycloalkyl, C₁₋₄alkyloxy, formyl, polyhaloC₁₋₄alkyl, NR⁹R¹⁰, C(=O)NR⁹R¹⁰, C(=O)-O-R¹⁴, R⁶, -O-R⁶, phenyl, Het³, C(=O)Het³ and C₁₋₄alkyl substituted with hydroxy, 5 C₁₋₄alkyloxy, C(=O)-O-R¹⁴, -Y-C₁₋₄alkanediyl-C(=O)-O-R¹⁴, Het³ or NR⁹R¹⁰;

Het¹ represents a heterocycle selected from pyrrolyl, pyrrolinyl, imidazolyl, imidazolinyl, pyrazolyl, pyrazolinyl, triazolyl, tetrazolyl, furanyl, tetrahydrofuranyl, thienyl, thiolanyl, dioxolanyl, oxazolyl, oxazolinyl, isoxazolyl, thiazolyl, thiazolinyl, isothiazolyl, thiadiazolyl, oxadiazolyl, pyridinyl, pyrimidinyl, pyrazinyl, pyranyl, 10 pyridazinyl, pyrrolidinyl, piperidinyl, piperazinyl, morpholinyl, thiomorpholinyl, dioxanyl, dithianyl, trithianyl, triazinyl, benzothienyl, isobenzothienyl, benzofuranyl, isobenzofuranyl, benzothiazolyl, benzoxazolyl, indolyl, isoindolyl, indolinyl, purinyl, 1H-pyrazolo[3,4-d]pyrimidinyl, benzimidazolyl, quinolyl, isoquinolyl, cinnolinyl, phtalazinyl, quinazolinyl, quinoxalinyl, thiazolopyridinyl, oxazolopyridinyl and 15 imidazo[2,1-b]thiazolyl; wherein said heterocycles each independently may optionally be substituted with one, or where possible, two or three substituents each independently selected from Het², R¹¹ and C₁₋₄alkyl optionally substituted with one or two substituents independently selected from Het² and R¹¹;

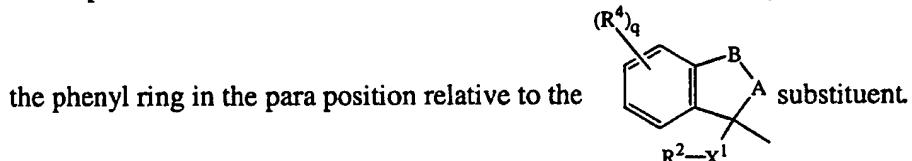
Het² represents a heterocycle selected from pyrrolyl, pyrrolinyl, imidazolyl, imidazolinyl, 20 pyrazolyl, pyrazolinyl, triazolyl, tetrazolyl, furanyl, tetrahydrofuranyl, thienyl, thiolanyl, dioxolanyl, oxazolyl, oxazolinyl, isoxazolyl, thiazolyl, thiazolinyl, isothiazolyl, thiadiazolyl, oxadiazolyl, pyridinyl, pyrimidinyl, pyrazinyl, pyranyl, pyridazinyl, dioxanyl, dithianyl, trithianyl, triazinyl, benzothienyl, isobenzothienyl, benzofuranyl, isobenzofuranyl, benzothiazolyl, benzoxazolyl, indolyl, isoindolyl, 25 indolinyl, purinyl, 1H-pyrazolo[3,4-d]pyrimidinyl, benzimidazolyl, quinolyl, isoquinolyl, cinnolinyl, phtalazinyl, quinazolinyl, quinoxalinyl, thiazolopyridinyl, oxazolopyridinyl and imidazo[2,1-b]thiazolyl; wherein said heterocycles each independently may optionally be substituted with one, or where possible, two or three substituents each independently selected from R¹¹ and C₁₋₄alkyl optionally substituted 30 with one or two substituents independently selected from R¹¹;

Het³ represents a monocyclic heterocycle selected from pyrrolidinyl, piperidinyl, piperazinyl, morpholinyl, thiomorpholinyl and tetrahydropyranyl; wherein said monocyclic heterocycles each independently may optionally be substituted with, where possible, one, two, three or four substituents each independently selected from hydroxy, 35 C₁₋₄alkyl, C₁₋₄alkyloxy, C₁₋₄alkylcarbonyl, piperidinyl, NR¹²R¹³, C(=O)-O-R¹⁴, R⁶ and C₁₋₄alkyl substituted with one or two substituents independently selected from hydroxy, C₁₋₄alkyloxy, phenyl, C(=O)-O-R¹⁴, -Y-C₁₋₄alkanediyl-C(=O)-O-R¹⁴, R⁶ and NR¹²R¹³,

Het⁴ represents a monocyclic heterocycle selected from pyrrolyl, imidazolyl, pyrazolyl, triazolyl, tetrazolyl, furanyl, thienyl, oxazolyl, isoxazolyl, thiazolyl, isothiazolyl, thia-diazolyl, oxadiazolyl, pyridinyl, pyrimidinyl, pyrazinyl, pyranyl, pyridazinyl and triazinyl.

5

2. A compound as claimed in claim 1 wherein the 6-azauracil moiety is connected to



10 3. A compound as claimed in claims 1 or 2 wherein X¹ is a direct bond and R² is Het¹, cyano, -C(=Q)-X²-R¹⁵ or C₁₋₆alkyl substituted with one or two substituents selected from hydroxy, cyano, -C(=Q)-X²-R¹⁵, amino, mono- or di(C₁₋₄alkyl)-amino, C₁₋₆alkyloxy, C₁₋₆alkylsulfonyloxy, C₁₋₆alkyloxycarbonyl, C₃₋₇cycloalkyl, aryl, aryloxy, arylthio, Het¹oxy and Het¹thio.

15 4. A compound as claimed in any one of claims 1 to 3 wherein -A-B- is -(CH₂)_r- or -(CH₂)_t-O-.

5. A compound as claimed in any one of claims 1 to 4 wherein p is 0, 1 or 2 and q is 0 or 1.

20 6. A composition comprising a pharmaceutically acceptable carrier and, as active ingredient, a therapeutically effective amount of a compound as claimed in any one of claims 1 to 5.

25 7. A process for preparing a composition as claimed in claim 6, , wherein a pharmaceutically acceptable carrier is intimately mixed with a therapeutically effective amount of a compound as defined in any one of claims 1 to 5.

8. A compound as claimed in any one of claims 1 to 5 for use as a medicine.

30 9. Use of a compound as claimed in any one of claims 1 to 5 in the manufacture of a medicament for treating eosinophil-dependent inflammatory diseases.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/09154

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C07D253/06 A61K31/53 C07D417/10 C07D413/10 C07D417/14
C07D413/14 C07D405/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C07D A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 96 31485 A (JANSSEN PHARMACEUTICA N.V.) 10 October 1996 (1996-10-10) page 26, line 29 -page 27, line 2; claim 1	1,8

Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 99/09154

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
WO 9631485	A 10-10-1996	AU	702947 B	11-03-1999
		AU	5275596 A	23-10-1996
		CA	2216653 A	10-10-1996
		CN	1181072 A	06-05-1998
		CZ	9703149 A	16-12-1998
		EP	0819122 A	21-01-1998
		HK	1007880 A	30-04-1999
		HR	960155 A	31-10-1997
		HU	9801575 A	28-01-1999
		JP	11503136 T	23-03-1999
		NO	974602 A	06-10-1997
		NZ	304877 A	29-06-1999
		PL	322654 A	16-02-1998
		US	5994376 A	30-11-1999